THE USE OF FINANCIAL RATIOS TO PREDICT ACQUISITION TARGETS: A STUDY OF UK MERGERS 1980-1986

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In loving memory of
my father

and

To my mother

ABSTRACT

The Use of Financial
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Financial reporting should provide decision makers with useful information . One qualitative characteristic of useful information is its classificatory value. Prior studies in accounting, economics and finance provide evidence that balance sheet and income statement ratios can be utilised to classify economic events such as mergers and bankruptcy which are of interest to decision makers.

This research examines the financial profile of U.K. firms acquired during the period 1980-1986. It also investigates whether the profile of financial characteristics of the observed firms provides a useful criterion for identifying those firms with a high probability of subsequently being acquired.

The use of funds flow measures in the analysis contributes to the classification accuracy of the models when one year data was employed. Although this has been applied to bankruptcy predictions, its contribution has not been tested in any previous U.K. merger studies.

The results for the univariate analysis indicate that the acquired firms during the period 1980-1986 have low profitability, high gearing ratios, low liquidity and low valuation ratios when compared with the non-acquired firms.

The multivariate analysis indicates the usefulness of accounting information in merger classification when the most recent data is used. It also suggests the existence of different attributes that are important in the acquisition classification model. It provides a strong indication throughout the different stages of the analysis that the asset undervaluation hypothesis and the profitability hypothesis are the most important discriminators and not the size hypothesis as had previously been assumed.

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CHAPTER ONE

INTRODUCTION

1.0 INTRODUCTION

Merger activity in the U.K. reached an unprecedented level during the last decade. The first recorded wave of merger activity occurred at the turn of the century and coincided with the rise of the corporation as the dominant form of organisation in the industrial and commercial sectors. A second merger wave occurred in the early 1920s. The reason behind this wave may be attributed to a change in the nature and organisation of industrial activity as more and more firms were gaining public quotations. Mass production brought scale economies to many areas of production, and new industries such as vehicles, chemicals and electrical engineering were growing rapidly. The first merger wave had a major impact on most sectors of manufacturing industry such as food and drink and electrical engineering. The mergers of the 1920s can be seen as having largely defined the shape that the British corporate economy would take for the remainder of the century. Many of the major firms which this wave created such as ICI still operate and occupy a dominant position in the U.K. manufacturing industry.

The third wave of merger activity occurred in the 1960s when a large number of firms disappeared. The motivation of many of the mergers during this period was to achieve large scale operating activity because this had been seen as necessary to achieve economies of scale and to reduce costs.

The 1980s have seen the fourth merger wave which has been partly motivated by the further internationalisation of the word economy. This new wave has witnessed a number of large and vigorously contested bids for major companies. A whole new culture has come into being, reflected in the language of the take-over. New concepts such as 'white Knight', 'greenmail', and 'poison pill' are now part of the everyday language of merger activity. Changes in the method for financing take-overs and merges have also emerged.

Despite this variety, there are also important common themes running through the history of merger activity in the U.K., high levels of merger activity have always been associated with different macroeconomic and legislative developments. Such activity is seen to be highly correlated to share price levels (King 1989).

The argument has been developed that this new merger wave has been justified on the basis that companies

and industries become old and inefficient, and the take-over process can bring about a new modern structure which otherwise might have evolved too slowly and too late (Jensen 1984).

However, others argue that the companies acquired are already efficient and that their subsequent performance after acquisition is not improved (Ravenscraft and Scherer 1988).

The above review of the trends exhibited by previous merger waves has indicated the differing nature of these various merger waves. As yet, no general, comprehensive and accepted theory to explain merger effects and motives has been defined. Therefore, by studying the financial characteristics of firms involved in merger activity during this current wave it is hoped to contribute to the formulation of a generally accepted 'theory of merger'.

1.1 RESEARCH OBJECTIVES

The main objective of this research is to assess the continuing validity of certain economic, financial, and strategic management hypotheses that were developed to explain earlier merger movements.

In addition, this study provides information about the financial characteristics of those firms involved in the merger process during the period 1980-1986. The current study also explores the usefulness of certain accounting information which has not been considered in previous merger studies, specifically, the information provided in the Funds Flow Statements.

The study examines the financial profile of firms acquired during the period 1980-1986. This is to investigate whether the profile of financial characteristics of the observed firms provides a useful criterion for identifying those firms with a high probability of becoming an acquisition target.

A number of financial ratios are used as proxy measures for a number of the hypotheses found to be predominant in the literature of mergers.

1.2 IMPORTANCE OF THE RESEARCH

This research is important for the following reason; the period covered by the study, 1980-1986 has experienced a major merger boom. The number of acquired firms in the U.K. during this period totalled 3569 with the value of these acquisitions being a total of £34692m of

which £14935 was for the year 1986. Other distinguishing features of this new merger boom include: (1) hostile take-over attempts and responses, (2) a substantial increase in the size of individual transactions, (3) focus on specific industries (4) the increase in leveraged buyouts, and management buyouts. Possible causes for this boom include the introduction of new corporate legislation and the soaring stock markets (Roberts, 1987). It is felt, therefore, that there is a need to study this new merger wave through examining the financial characteristics of firms acquired during the period 1980-1986.

This study is also important as it includes a discussion of methodological and statistical issues and limitations which prior studies have failed to report. For example, none of the U.K. studies described in Chapter Five have reported on the distribution of the data and what effect this might have on the classification accuracy of the models.

Furthermore, the present study reports on the added advantage of using funds flow measures in merger classification studies. This is an issue found to be important in bankruptcy studies, but one which has not previously been examined in the context of mergers.

1.3 PRIOR RESEARCH

The literature on mergers indicates that the research in this area has taken two major approaches. Research has been concerned with the effect of merger activity on the profitability of both the acquired and the acquiring firms' shares (The Shareholder Wealth Effect of Take-overs). In the U.K. a number of studies have been undertaken to investigate the profitability of mergers and take-overs. These include the studies by Franks, Broyles and Hecht (1977), Firth (1979 and 1980), and more recently the studies by Franks and Harris (1989).

The general conclusions drawn from these studies indicate that most of the gains from merger activity accrue to the shareholders of the acquired company. Similar conclusions on the gains for the acquired company's shareholders have been arrived at by the empirical evidence provided for the US. (see for example Mandelker, 1974; Dodd, 1980; and Asquith, 1983).

Given the significant financial gains from mergers, the other line of research was concerned with studying the financial characteristics of firms involved in the acquisition process. The aim was to enable the 'investment community' to predict take-over targets to enable them to earn a potentially abnormal return. Another interest

developed by researchers has been to study the usefulness of accounting information in merger decisions. This in turn involves the assessment of merger theories and hypotheses developed in the literature.

In the United Kingdom the financial characteristics of acquired and non-acquired firms have been considered, at least in part, in most of the research work devoted to mergers. They include the studies of Newbould (1970), Singh (1971), Buckley (1972) and Kuehn (1975). Chapter Five provides a detailed discussion of these studies. The general conclusion drawn from the above mentioned studies is that there are certain financial variables which differentiate between the acquired and the non-acquired groups of firms, and that such variables change over time. The above studies have been conducted in the 1960s and early 1970s. Most of the above mentioned studies have used univariate analysis to study the financial characteristics of acquired and non-acquired firms (except the studies by Singh (1971) and Kuehn (1975)). In selecting the predictor variables none of the above mentioned studies relied on the hypotheses provided in the literature as an explanation of merger motives. Instead they based their selection of variables on one or more of the three criteria: (1) they have been used in previous studies (2) there was evidence that they may be important (3) their logical soundness.

In this study, the characteristics identified as significant discriminator between the acquired and the non-acquired firms were identified with the implicit assumption that all acquiring firms adopted the same merger selection criteria. Relaxing this assumption, however, merger decision is considered to involve several motives that are expected to satisfy the various objectives determined by the parties involved. That is, mergers depend upon what the acquiring firm is looking for and what the acquired is offering. Hence not only the characteristics of acquired firms important in the selection process but the acquiring firm's characteristics are also important. However, arriving at general conclusions about the characteristics of the acquired firms can offer valuable insights into the motives for merger activity. Therefore, the financial variables which are collected for the acquired and the non-acquired groups, are included as proxy measures for economic and financial hypotheses which have been developed in the disciplines of economics and finance.

The following section provides a summary of the hypotheses that were found to be important in the merger literature, and which indicate certain company attributes which may determine merger vulnerability.

1.4 RESEARCH HYPOTHESES

The first hypothesis tested in this study is the **inefficient management hypothesis**. According to this hypothesis the acquired company's management does not operate at maximum potential. It suggests that a consistently poor performance by the firm makes it more vulnerable to acquisition. The acquired and the non-acquired firms can be differentiated by their profitability attributes.

The second hypothesis is the **assets undervaluation hypothesis**. This hypothesis indicates that when a company underutilises its assets or when its management does not operate at full potential, its stocks will be undervalued by the market. Hence, a low valuation ratio is an indication for the acquirer that it would be more economical to expand its business by purchasing the undervalued firm than by expanding through the use of internal investment.

The third hypothesis is the **price earning magic hypothesis**. This hypothesis indicates the existence of an instantaneous gain accruing to the acquirer when it acquires a company with a lower P/E ratio. Hence, the lower the P/E ratio, the higher the probability of a firm being a take-over target.

The fourth hypothesis is the **financial synergy hypothesis**. According to this hypothesis, financial synergy related to debt capacity could be achieved through merger. It has been suggested that a firm becomes an attractive merger candidate if its capital structure provides the acquiring firm with latent debt capacity (Lewellen, 1971). Another synergistic financial motive is achieved when a firm acquires a cash rich firm to improve its own liquidity to fund investment in the acquiring firm's existing business.

The fifth hypothesis is the **size hypothesis**. According to this hypothesis the smaller the firms' size the higher the probability of it being an acquisition target. It has been suggested in the literature that acquiring small-sized firms reduces the cost of acquisition and the acquiring company can easily absorb and more efficiently manage the acquired resources.

The sixth hypothesis is the **growth resources imbalance hypothesis**. This hypothesis refers to the existence of a mis-match between the resources and the investment opportunities available to a firm. It states that firms with growth resources imbalance are likely to be acquisition targets. This could involve one of two situations:

1) A firm which has excess cash and lacks profitable investment opportunities is likely to be an attractive acquisition target.

2) A firm which suffers from constraints of capital to invest in profitable projects, will look for cash-rich firms to finance potential investment opportunities.

1.5 RESEARCH DESIGN AND METHODOLOGY

The design of this research is divided into four main parts; namely, the setting of the hypotheses, data collection, sample selection, and selection and application of the appropriate statistical techniques.

A set of hypotheses deemed to be important has been constructed after consulting the available literature on the subject of mergers and acquisitions, and after taking into account the objectives of the research. A number of financial variables have been used as a surrogate measures for these hypotheses, in addition to a number of suitable predictor variables which are explained in detail in Chapter Six have been included in the present study.

Sample selection is one of the most important issues in research design. For the present study, two sample selection techniques were used. Firstly, a stratified random sampling procedure has been used in

selecting the non-acquired group (a type of probability sampling). This type of sampling involves dividing the population into strata, and simple random samples are taken from each stratum where all samples are put together to form the sample for the research. The number of this group amounted to 224 firms. Secondly, for the acquired group of firms, the researcher found that the identified population is sufficiently small to include all its member in the sample. However, the unavailability of information for a number of firms has led to the omission of those firms from the sample. The final sample included 118 acquired firms.

Three main statistical techniques have been employed to provide a satisfactory analysis for the data collected. The first stage of the analysis has involved the use of univariate technique, where both parametric and non-parametric statistical tests were employed. The second stage of the analysis involved the use of multivariate discriminant analysis as the main technique for developing the classificatory models for mergers. The logistic regression technique has been used at the third stage of the analysis to overcome some of the problems associated with data distribution assumptions alleged to affect the classification accuracy of the models.

1.6 MAIN FINDINGS

A series of findings were reached based upon the research results. These findings reflect the objectives of the study and are presented at each stage of the analysis.

- The first stage of data analysis which involved the use of univariate analysis indicated that the acquired group can be differentiated from the non-acquired group by using some of the financial ratios considered. The results indicated that the firms acquired during the period 1980-1986 have low profitability, high gearing ratios, low liquidity and low valuation ratios when compared with the non-acquired firms.

- The examination of the distribution of the ratios used in this study indicated that many ratios are not well described by a normal distribution. This is caused by varying degrees of skewness and the existence of extreme outliers.

- The second stage of the analysis involved the use of multivariate discriminant analysis (MDA) to develop the final classification models for the study. Four different sets of models were presented. The first set consists of five discriminant functions, each function represents 1,

2, 3, 4, or 5 years average data. In this first set only those variables which have proved to be significant in differentiating between the two groups (the acquired and the non-acquired) when using univariate analysis were used. The aim was to examine whether the coefficients of these variables were significant when they enter the model together.

The second set of models were calculated using all the predictor variables that were selected as proxy measures for the hypotheses mentioned earlier. However, the funds flow measures were not included in the analysis at this stage.

In the third set of models, the funds flow measures were also included in the analysis. The aim was to assess the usefulness of this type of information in merger classification studies. This assessment is important as recent research has been conducted into the use of fund flow information in predicting corporate failure, but has not been used in predicting corporate acquisitions.

The fourth set of models included the use of industry-relative ratios. These have been created by dividing a firm's ratio by the industry's average ratio.

The statistical analysis used to develop these models is presented in Chapter Eight. The analysis has indicated the usefulness of accounting information in merger classification when the most recent data are used. It has also indicated the existence of different attributes that are important in the acquisition classification models.

In the model with the highest classificatory power (the one year model with all ratios including the funds flow measures were used to arrive at the final discriminant function) the inefficient management hypothesis, the asset undervaluation hypothesis, and also the resources imbalance hypothesis were supported by the evidence. However, the relatively poor discriminant power of the model might be an indication of the existence of different factors affecting the acquisition process during the period under study which the present study could not identify.

- For the third stage of the analysis, a logistic stepwise statistical procedure was used to develop three sets of models.

The model with the highest classificatory power was the one where the information of four years before acquisition have been used. In this model the asset undervaluation hypothesis and the inefficient management

hypothesis were supported by the evidence. However, the classification accuracy declined to 66.1 per cent when using logistic regression compared to 73.1 per cent when multivariate discriminant analysis (MDA) was used. This has led to the conclusion that the high classification accuracy reported by other researcher has been biased as a result of ignoring the methodological issues that have been raised regarding the violation of MDA assumptions.

1.7 RESEARCH OUTLINE

The current chapter has introduced the topic under study and has outlined the research objectives, highlighted the importance of the study, and provided a summary of prior research studies on the subject of mergers and acquisitions. It has also explained the research hypotheses, discussed the research design and methodology, and summarised the main findings of the study. The remainder of the study includes a literature review (Chapter Two, Three, Four, and Five), research methodology and design (Chapter Six), analysis of data and findings (Chapters Seven and Eight) and conclusions (Chapter Nine).

Chapter Two reviews the history of merger activity in the U.K. and provides a statistical presentation of this activity.

Chapter Three explains the evolution of the predictive approach in the accounting literature. The contributions of this approach and the limitations recognised are examined.

Chapter Four discusses the theories of merger motives which have been identified in the literature of finance, economics and management strategy. The theoretical and empirical findings are reviewed, and the implications of the empirical and theoretical literature to this study are discussed.

Chapter Five reviews the previous empirical studies on mergers and acquisitions based in the U.K. and other countries. The findings and methodologies presented in these studies are evaluated. The major differences between the current study and other U.K. studies are also discussed.

Chapter Six describes the methodology utilised in the present study to investigate the usefulness of accounting information in merger prediction. This involves a discussion of the research questions and research design. It also includes a description of the data acquisition process which includes the sample selection process, the variable selection and the selection of predictor variables.

Chapter Seven presents the results of the study. Univariate comparisons of the financial characteristics of acquired and non acquired firms are presented. A comparison of these results with prior research findings is provided.

The results of the multivariate discriminant analysis are presented in the first part of Chapter Eight. The second part of Chapter Eight introduces the finding of the study using logit analysis.

Finally, Chapter Nine presents the overall conclusions of the study. Limitations of the study are discussed and suggestions for further research are made.

CHAPTER TWO

THE HISTORY OF MERGER ACTIVITY IN THE UNITED KINGDOM

2.0 INTRODUCTION

The aim of this chapter is to provide a survey of the history and pattern of merger activity in the United Kingdom. Mergers have been considered as an important phenomenon of British industry since the development of the modern corporation in the early twentieth century, when these corporations became the dominant vehicle of business activity in the British economy.

Take-overs and merger activity has always occurred in waves. To perceive the reasons for the waves of take-over activity, one has to look at those factors which create an environment in which take-overs are promoted. Roberts (1987) identified the following factors:

- Rising Stock Market

The argument has long been developed in the literature of finance and economics about the existence of a relationship between take-over activity and share price

movements. The rational explanation is related to the fact that take-overs appear cheaper when share prices are high. This stimulates stock exchange dealing and provides investors with profits on their holdings which in turn boost share prices. However, Geroski (1984) indicated that such a relationship does not appear to exist.

- **Rationalisation**

In the late 1950s and early 1960s the growth of industrial capacity in some third world countries sparked a series of take-overs in the U.K. textile industry which was eager to lower its operational costs through consolidation. Other traditional manufacturing industries such as steel, shipbuilding, capital goods (especially heavy electrical), television manufacture and even the aircraft and motor manufacturing industries encountered similar circumstances.

- **Legislation**

Until the late 1950s, a policy of **resale price maintenance** was in operation. This allowed manufacturers to dictate minimum prices at which their branded goods could be sold. However, between the late 1950s and mid 1960s this resale price maintenance mechanism was abolished. Consequently this led to a decline in profits

made by shopkeepers, but paved the way for supermarkets which sell in greater volumes, to compensate for lower profit margins, to grow. This then brought about a series of take-overs in the food manufacturing industry.

The introduction of corporate tax in 1965 also activated merger activity during this period. It was imposed on all profits at the relatively high rate of more than 40 per cent, and whatever was paid in dividends to shareholders was subject to income tax. This led to a sharp increase in the amount of profit needed for a company to maintain the same net dividend to its shareholders. The profit increase required was far greater than almost any company could achieve from an immediate growth of its existing business. The policy that many companies adopted was to make acquisitions which would increase pre-tax profits by more than the increase in share capital on which dividends had to be paid.

This latest wave of merger activity in 1985 is believed to have been influenced by the legislation that was introduced in 1984 which allows the phasing out of investment allowances. Previously, in an attempt to encourage investment, companies could write off against their profits the entire cost of plant and equipment bought during the year. There was some evidence, however, that by the early 1980s, rather than stimulating an increase in

capacity this was encouraging industry to become more capital-intensive, and thus, to invest largely in saving labour, when this became relatively more expensive due to scarcity and increased demand. Investment allowances were phased out, hence many firms chose to expand via external acquisition.

In the 1960's and early 1970's, mergers were generally between firms in related businesses. The main reason for these mergers was to minimise competition, and also the rationalisation of production through increased concentration of production and by sharing the same services.

Over time, however, the attitude towards this trend has changed. Merger regulations have been established to control the effect of such merger activity on concentration and competition. In 1965 for example, the power of the Monopolies and Merger Commission was extended to allow it to investigate mergers and recommend, where a merger seemed likely to operate against the public interest, that the Secretary of State should prevent it from going ahead. These issues will be elaborated upon in Chapter Four as part of a discussion on the financial and legislative environment which affects the merger process.

The following discussion provides a historical review of the characteristics of merger waves in the United Kingdom. It will also include evidence on the recent merger wave which is of particular importance to the current research.

2.1 THE PERIOD BETWEEN 1897-EARLY 1920s

Two merger waves occurred during this period. The first cycle of significant merger activity occurred at the end of the nineteenth century with a peak in 1898-1900

This merger wave is considered to have been mainly horizontal in nature, occurring between firms that had been competing against each other in the same industry or trade. According to Hannah (1974), at least 87 per cent of the mergers in that period were horizontal, with 12 per cent vertical, and less than 1 per cent involving diversification. The merger activity during this period was concentrated in a relatively small number of industries, including textiles and brewing. The merger wave was seen as a response by these industries to technical and environmental changes which were important factors in the development of concentration in these industries. Merger activity took place because of the development of international trade, and changes in technology, and

financial and management techniques. This resulted in an increase in large firms relative to small firms, nonetheless, some of the mergers appeared to have had few other motives beyond increasing prices to consumers by the establishment of a near monopoly (Smith and Brooks, 1963). For example, mergers in the iron and steel industries sought to achieve technical integration and control over supplies and outlets through vertical mergers. This led to increases in concentration because merger activity allowed large firms to grow relatively more quickly both internally and externally.

Some of this period's mergers also resulted in re-organisation, through the closing down of inefficient plants and by improved administrative and marketing arrangements across the expanded organisation.

The second major wave was that of the 1920s. A number of mergers in the banking sector during and immediately following the war left five giant banks in a dominant position. Additionally, in many manufacturing industries there had been some mergers and take-overs during the war and that number grew rapidly in subsequent years. For example, by the end of the war the chemical industry was dominated by five large firms, which had themselves been created or expanded by mergers and acquisitions: Brunner, Mond, British Dyestuffs Corporation,

United Alkali, and Nobel Industries which. In 1926 these five companies amalgamated to form one of Britain's largest chemical companies; ICI. The integration of these firms can be considered as a type of vertical integration, in that the five firms were partly dependent on each other for supplies.

2.2 THE PERIOD BETWEEN 1940-1969

This period was characterised by a noticeable growth of large firms as well as a rise in merger activities in general. It also witnessed a number of hostile merger and take-over battles in which large companies were absorbed, for example, the merging of Austin and Morris in 1952 to form the British Motor Corporation; the struggle between Tube Investments in association with Reynolds Metal, and Alcoa, which resulted in the former gaining control of British Aluminium.

During the period 1949-52, the number of quoted companies rose from 2,700 to 2,900. The number of quoted companies remained roughly the same between 1953-1957, but in the period 1958-1960, the merger process reduced the number of quoted companies by about 100 a year from 2,900 to 2,600 and acquisition expenditure averaged £300 million per annum.

During the 1960s, mergers were generally the primary influence on the structure of industry in the U.K. which led to a significant increases in concentrations in most industries, especially in brewing, electrical, engineering (led by G.E.C.) and textiles (led by Courtaulds) (Hannah and Kay 1977).

Supporting this evidence, Hart and Clarke (1980) examined the period from 1958 to 1968, and concluded that roughly half of the increase in concentration was as a result of merger activity.

In terms of aggregate concentration, the period 1949-1958 saw the share in net output of the top 100 U.K. manufacturers rise from 22 per cent to 32 per cent (an increase of almost 50 per cent).

Hannah and Kay (1977) also indicated that mergers accounted for more than 100 per cent of the increase in concentration between 1957 and 1967. In the absence of merger activity, industry concentration would have experienced a net drop.

The Financial Times in 1961 supporting such evidence indicated that: "Mergers and bids are not by any means the only reason for the steadily increasing concentration of industry, their relative importance in the

process has yet to be accurately assessed"[1].

Moreover, a peak was reached in 1965 when there were 1000 recorded mergers involving the acquisition of assets amounting to £517 million. From 1954 to 1965 horizontal mergers predominated, amounting to 67 per cent by number and 71 per cent by value of assets. As a result of the introduction of the 1965 Act, which gave power to the government to control certain mergers, there would appear to be a developing trend from horizontal mergers to diversified merger to avoid bids being referred to the Monopolies and Merger Commission (MMC) on the basis of industry concentration issue.

Goudie and Meeks (1982) examined the role of acquisitions and mergers in diversification amongst U.K. companies during the period 1949 to 1973. They found that 33 per cent by value and 39 per cent by number of acquisitions and mergers over the period involved diversification.

1968 saw the disappearance of the largest number of firms through merger activity. The motivation of many of the mergers in this year was to grow in size, because

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1. F.T, 30 March 1961.

this was seen as necessary to achieve economies of scale and to reduce costs.

The intervention by the Government to restructure industries contributed to the development of the concept of the industrial giant, a concept which was attractive to the firms themselves who were keen to develop the status of large-scale enterprises. For example, in 1966 the Industrial Reorganisation Corporation (IRC) was established to encourage rationalisation in the manufacturing sector.

2.3 THE PERIOD BETWEEN 1970-1980s

This was a period of intense merger activity. Table 2.1 provides data on the expenditure, and numbers of company acquired during the period 1963-1989.

As the table shows, merger activity in terms of both acquisition value and numbers acquired in the period 1974-81 was around half that experienced during the years 1967-73. In 1984 however, expenditure rose significantly. By 1986, expenditure in real terms was in excess of the levels reached in the previous post-war peak years of 1968 and 1972. However, there was no corresponding increase in numbers acquired.

Table (2.1)

Merger Activity In the U.K. Between 1963-1989

Year	Number acquired	Value at (£m. historic prices
1963	888	352
1964	940	505
1965	1000	517
1966	807	500
1967	763	822
1968	946	1946
1969	846	1069
1970	793	1122
1971	884	911
1972	1210	2532
1973	1205	1304
1974	504	508
1975	315	291
1976	353	448
1977	481	824
1978	567	1140
1979	534	1656
1980	469	1475
1981	452	1144
1982	463	2206
1983	447	2343
1984	568	5474
1985	474	7090
1986	696	14935
1987	1125	15263
1988	1224	22123
1989	1039	26104

Sources: Fairburn and Kay (1989), p 149. (for the years 1967-1985. Bannock (1990), p 40. (for the years 1986-89).

A notable feature of the merger activity occurring during this period is the high level of vulnerability of large companies. During the decade 1972-82, one in three of the largest 730 manufacturing companies quoted on the U.K. stock markets were acquired, whilst in the mid-1980s boom 137 of the largest one thousand non-financial companies

were lost through takeover in the four years from 1982-86.

The present merger wave is therefore characterised by relatively few, comparatively large mergers. At one stage in 1986 there were four proposed manufacturing mergers involving one or more bidders worth over £1 billion each (United Biscuits/Imperial/Hanson Trust £1.2-1.9 billion; GEC/Plessey, £1.2 billion; Argyll/Distillers /Guinness, £1.9 billion; and Elders IXL/Allied, £1.8 billion). Ten per cent of the independent companies acquired that year accounted for over 85 per cent of the total expenditures, whilst the top 10 per cent of subsidiaries acquired accounted for over 60 per cent of the total acquisition expenditure on subsidiaries (Business Monitor MQ7, 1987 Quarter 1).

Thus it would appear that size in itself does not provide a guarantee of immunity from takeover and the notion, developed during the earlier period, that there is a well established non-linear relationship between the probability of acquisition and size, is still to be verified.

The effect of mergers on concentration has increased, at least up to the late 1970s. By 1970, the share of manufacturing net output held by the largest 100 firms had risen to 50 per cent (Hart and Clarke 1980).

In the late 1970s and early 1980s, the degree of aggregate concentration in the U.K. has been relatively stable, or has experienced only a slight increase (Bannock and Peacock 1989), but merger activity was low during this period. By 1971, the total number of firms acquired was 884 while in 1985 the total number fell to 474. By 1989 this total had risen to 1030, so it seems quite possible that the recent merger boom will have reversed this decline in aggregate concentration.

Another feature of mergers in this period is that the use of shares versus cash has fluctuated considerably and there has been no clear trend in favour of one or the other. However, there was a sharp increase in cash financing in 1989 at 82.4 per cent compared to 27.7 per cent in 1969 as table(2-2) shows. The use of fixed interest securities has however tended to decline since the end of the 1960s.

Neither the effects of taxation nor the level of share prices seem to provide a satisfactory explanation for changes in the proportion of cash expenditure in acquisitions (Bannock, 1990).

Table (2-2)

Percentage of Total Expenditure on Acquisitions Accounted for by Cash and Issues of Securities 1969-1989

year	cash	issue of ordinary shares	Issue of fixed interest securities	Total
1969	27.7	51.6	20.7	100.0
1970	22.4	53.1	24.5	100.0
1971	31.3	48.0	20.7	100.0
1972	19.5	57.6	22.9	100.0
1973	53.0	35.7	11.3	100.0
1974	68.3	22.4	9.3	100.0
1975	59.4	32.0	8.6	100.0
1976	71.7	26.8	1.5	100.0
1977	62.1	36.9	1.0	100.0
1978	57.4	40.6	2.0	100.0
1979	56.3	31.1	12.6	100.0
1980	51.5	45.4	30.1	100.0
1981	67.7	29.6	2.7	100.0
1982	58.1	31.8	10.1	100.0
1983	43.8	53.8	2.4	100.0
1984	53.8	33.6	12.6	100.0
1985	40.3	52.3	7.4	100.0
1986	25.6	57.9	16.5	100.0
1987	32.2	62.3	5.5	100.0
1988	69.7	21.9	8.4	100.0
1989	82.4	12.7	4.9	100.0

Source: Bannock 1990

An equally important feature of the current wave is the increasing level of cross-border mergers. As the following table shows the number of European cross-border mergers has increased to 5138 in 1989 compared to 596 in 1984, while the value had risen to 85759 million in 1989 compared to 7050 in 1984.

Table (2.3)

Completed Acquisitions in Western Europe
1984-1989

Year	Total No.	Value £M
1984	569	7,050
1985	1138	3,414
1986	1565	29,045
1987	2246	36,274
1988	3361	52,659
1989	5138	85,759

Source: Cartwright and Cooper, 1992

2.4 SUMMARY AND CONCLUSION

The general conclusion that can be drawn from the above review is that the recent wave of mergers is of particular interest to market watchers and academicians due to its unique and dynamic nature. Past merger waves were easily classified in terms of size, type (i.e. horizontal, vertical, conglomerate) and industry group. In contrast, mergers during the 1980s have been a mixture of all three types and have affected all industries. Furthermore, they have been characterised by fewer, larger acquisitions, and have been financed predominantly by cash and equities instead of purely by equity.

CHAPTER THREE

ACCOUNTING INFORMATION AND THE PREDICTIVE APPROACH TO ACCOUNTING THEORY FORMULATION

3.0 INTRODUCTION

This chapter is concerned with illustrating the linkages that exist between the establishment of accounting theory, the availability of accounting information and the practical use of this information in empirical research. By providing such an illustration, it is hoped that the importance of the present study in contributing to the process of evaluating the relevance of financial information in empirical work will be highlighted. This is seen as a necessary step in the future developments of accounting theory. The main focus of this chapter is on the historical development of the predictive approach and its contribution to the development of accounting theory. The objectives of financial statements are discussed and issues related to financial statement analysis are indicated. The discussion of the predictive approach, together with other approaches to the formulation of an accounting theory, is elaborated upon. This elaboration involves the discussion of studies that have used financial

information such as ratios in predicting economic events (e.g. bankruptcy, bond rating, and loan lending decisions).

3.1 ACCOUNTING INFORMATION THEORY AND THE OBJECTIVES OF FINANCIAL STATEMENTS

One of the main objectives stated for positive accounting theory is to provide a basis for the prediction and explanation of accounting behaviour and events. A theory is a set of concepts (words) which presents a series of expectations or predictions about phenomena, when those expectations or predictions occur, the theory is said to be confirmed. Hence, the development of a theory is the result of two processes: The construction process and the verification process. If a theory has not been verified using certain test procedures, the need then arises to modify the original theory or to develop a new theory.

Although this definition was originally developed to describe a scientific theory, a number of authors were able to apply this definition to accounting. Hendrisken (1977) defines 'accounting theory' as "a set of broad principles that (1) provides a general frame of reference by which accounting practice can be evaluated and (2) guides the development of new practices and procedures" (p 1). According to this definition, the main objective of accounting theory is to provide the general principles that

can be used as a guide to perform and assess the different accounting practices and procedures.

McDonald (1972) has indicated that in the case of accounting, a theory should include three elements: (1) encoding of phenomena to symbolic representation, (2) manipulation or combination according to rules, and (3) translation back to real-world phenomena. Indeed examining corporate reports indicates the existence of such elements. Using debit or credit terms constitutes the symbolic transformation of activities, and the means of calculating profits and cash flows are governed by certain rules. Relating the profit figures to the firm's economic activities that have been conducted as a means of generating those profits represents the implementation of the third element.

Although the accounting discipline has accepted the definition of a theory described earlier, no single comprehensive theory of accounting has yet been developed. Instead, different accounting theories have emerged in the literature. The reason(s) for this might be due to the fact that the setting in which accounting operates is a complex and dynamic one, hence, the need always arises to develop new theories to satisfy new demands and to cope with the changing environment of accounting. The American Accounting Association's Committee on Concepts and

Standards for External Financial Reports (1977) has supported this view. It concludes that:

> 1. No single theory of financial accounting is rich enough to encompass that full range of user- environment specification effectively; hence,
>
> 2. There exists in the financial accounting literature not a theory of financial accounting, but a collection of theories which can be arrayed over the differences in user-environment specifications.

Belkaoui (1985) has indicted the existence of two approaches to the formulation of an accounting theory. The traditional approach and the newer approaches. The traditional approaches are the following:

1- Non- theoretical, practical, or pragmatic (informal)

2- Theoretical

   a. Deductive
   b. Inductive
   c. Ethical
   d. Sociological
   e. Economic
   f. Eclectic

On this traditional approach he stated that:

> "The traditional approach to the formulation of an accounting theory has employed either a normative or a descriptive methodology, a theoretical or a non-theoretical approach, a deductive or an inductive line of reasoning, and has focused on a concept of "fairness", "social welfare" or "economic welfare". The traditional approach has evolved into eclectic

> approach and is beginning to be replaced by newer approaches ..... Whatever approach is chosen, it is important to remember that an accounting theory must be confirmed to be accepted". (p 21)

Developments in accounting environments have lead to the development of new approaches. The following section briefly discusses these approaches. They include; the regulatory approach, the behavioural approach, the events approach, and the predictive approach.

3.1.1 The New Approaches Available for the Formulation of Accounting Theory

3.1.1a The Regulatory Approach

The regulatory approach to accounting theory is concerned with determining the best means of formulating and implementing accounting standards. Accounting standards are set to enable producers of financial statements to provide the financial information required by users in a uniform and accepted format. Adoption of the regulatory approach to accounting standard setting will guarantee this uniformity.

3.1.1b The Behavioural Approach

The main aim of the behavioural approach in accounting is to explain and predict human behaviour in all possible accounting contexts (Belkaoui, 1985). Thus the behavioural approach emphasises the relevance of the information communication process in decision making, and the effect of this information on the behaviour of individuals and groups who use this information.

3.1.1c The Events Approach

The events approach suggests that the purpose of accounting is to provide the information needed to explain economic events that might be used as an input to decision making models. Consequently, this suggests that the user rather than the accountant who transforms the event into accounting information relevant to the users' own decision model. Hence, the level of aggregation and evaluation of accounting information is decided by the user. This eclectic approach adopted by the user might affect the quality of the information he ultimately derives from a published financial statement, and in fact this will depend on his attitude toward certain events and certain types of reports.

3.1.1d The Predictive Approach

The predictive ability criterion has been used in the accounting discipline as a means of evaluating alternative methods of accounting measurement. According to this approach, alternative accounting measurements are evaluated in terms of their ability to predict events of interest to decision-makers. The studies, reviewed later in this chapter and in Chapter Five which use financial statement numbers to predict events, like bankruptcy, bond ratings and loan decisions are an application of this approach.

3.2 ISSUE RELATED TO FINANCIAL STATEMENT ANALYSIS

Financial statements are designed to provide information about the entity in order to help different types of users to make rational economic decisions. Such an objective has been acknowledged among practitioners and researchers in both the US and the U.K.

In the US the 1973 Report on Objectives of Financial Statements (The Trueblood Report) stated the following objective, amongst others, of financial reporting and financial statements.

"The basic objective of financial statements is to provide information useful for making economic decisions".

The implication of this basic objective relates accounting to the economic decision-making process with the aim of achieving efficient resource allocation.

This economic decision making process involves different parties who are the users of financial statement information, and include: (A) shareholders, and investment analysts; (B) managers;(C) employees; (D) lenders and creditors; (E) customers; and (F) Government agencies (Arnold et al 1984, and Foster 1986).

3.2.1 Shareholders and Investment Analysts

A frequent decision facing shareholders and investment analysts is whether to buy, hold or sell shares in a particular company. This kind of decision requires certain information to enable shareholders to estimate the value of a particular company's shares to an investor, taking into account the investor's (shareholder) preference for risk, return, dividend and yield. The needs of these users for financial information has been indicated in the Report on the Objectives of Financial Statements mentioned earlier, and FASB concept No 1. This states that:

> An objective of financial statements is to provide information useful to investors and creditors for predicting, comparing,and evaluating potential cash flows to them in terms of amount, timing, and related uncertainty.

> An objective of financial statements is to supply users with information for predicting, comparing, and evaluating enterprise earning power.

A model which is widely used to estimate the value of shares is the 'dividend valuation model'. In order to use this model to assist in making buy, hold, or sell decisions, the investor needs information in order to estimate the future receipts from shareholding, and information about the risk associated with the expected receipts. This will enable him to select the appropriate discount rate.

A different decision facing shareholders is related to their intervention in the running of the company and whether to intervene to influence management's actions in running the company. The use of financial information to monitor the behaviour of management is the result of the separation of ownership from control which is a common feature of the modern corporation. The Report on the Objectives of Financial Statements indicated the existence of such conflict and stated that:

> An objective of financial statements is to supply information useful in judging management's ability to utilize enterprise resources effectively in achieving the primary enterprise goal.

In the U.K. the Corporate Report published in 1974 by the Accounting Standards Steering Committee arrived at a similar conclusion on the objectives of the corporate report;

> "the fundamental objective of corporate reports is to communicate economic measurements of and information about the resources and performance of the reporting entity useful to those having reasonable right to such information"

Both countries' stated objectives above give an indication of the need for information to be used in the decision making process. These decisions will have either an 'investment focus' or a 'stewardship focus' (Foster 1986, p 2).

3.2.2 Managers

Managers use financial statement information in many of their financing, investment, and operating decisions. For example, leverage ratios and interest coverage ratios are important when management is setting plans to raise long term debt. Management also frequently

refer to financial information disclosed by other companies in the same industry to evaluate their own performance relative to these other firms.

3.2.3 Employees

One decision facing all employees is whether to remain with their existing employer or to seek another opportunities elsewhere. The factors affecting such a decision will vary from employee to employee. However, the most important common factor influencing their decisions is the financial rewards available. Hence, in deciding whether to change jobs or not, an employee will require certain information in order to be able to estimate his future salary prospects; financial statements are an important source of information about current and potential future profitability and solvency. Additionally, employees can also demand financial statements to monitor the viability of their pension plans (Foster 1986).

3.2.4 Lenders and Creditors

Lenders and Creditors are individuals or financial institutions to whom an entity owes money. The two main decisions facing lenders and creditors in dealing with an entity are, first, whether to make further loans and

second, whether to extend or cut the repayment period of loans due to them. Financial statements can often help in making such decisions. For example, many banks consider information relating to an entity such as liquidity, leverage, and profitability when deciding upon the terms of the loan (i.e. the amount of the loan, the interest rate and securities to be requested).

3.2.5 Customers

Customers, on the other hand, show an interest in the performance of an entity with which they have a long-term relationship. Their interest might be developed after buying goods or acquiring services provided by the entity. This interest is likely to increase if concerns develop about possible bankruptcy. In addition, the interest of customers in the price or quality of the goods and services indicate that they need information which allows them to monitor price movements and changes in quality. Thus any marked changes can be monitored and where appropriate, notified to an official regulatory body for investigation. The financial statements of the company are therefore one source of information available to customers to enable them to evaluate the company's performance and profitability.

3.2.6 Government and Regulatory Agencies.

The government may be interested in financial information for the purposes of regulatory intervention. For example, deciding whether to give financial support to distressed companies or to give approval to an international take-over of a domestic company. Other interests of government in the financial information of companies are related to the implications of its tax and economic policies.

3.3 FINANCIAL STATEMENTS AND THE PREDICTION OF ECONOMIC EVENTS

The general aim of accounting is to provide information that can be used to predict business events. The predictive value criterion is a probability relationship between economic events of interest to the decision maker and relevant predictor variables derived in part from accounting information (Belkaoui 1985). Hence, this section provides a review of the empirical evidence available for the U.K., the US and other countries on the use of financial information in predicting bankruptcy, bond rating and credit and bank decisions.

Financial ratios are transformations of financial statements data which are made by the users of financial statements to aid decision making. Bankruptcy or take-overs are important economic events which a firm faces. Accounting data taken from a firm's financial statements are the basis of decisions made about the firm which are of interest to users of financial statements. For investors, predicting the future is what financial statement analysis is all about. For management, financial statement analysis is useful both as a way of anticipating future conditions, and more importantly, as a starting point for planning actions that will influence events in the future.

3.3.1 Corporate Bankruptcy Prediction

The bankruptcy phenomenon has been a common subject of study since William Beaver's seminal study in 1966 and Edward Altman's influential multivariate study (1968). The following section reviews the major studies concerned with the ability of financial ratios to predict bankruptcy in the US, the U.K. and other countries.

3.3.1a Empirical Studies In The United States

Beaver (1966) was among the first to study the ability of financial ratios to predict corporate failure. His study was an impetus for the numerous financial distress studies that have been completed since. Using univariate analysis, he compared the group mean (for bankrupt vs the non bankrupt companies) of 30 financial ratios which were computed for five years prior to bankruptcy. The ratios were divided into six broad categories: cash flow, net income, debt to total assets, liquid assets to total assets, liquid assets to current debt, and turnover. The ratios were selected on the basis of three criteria: popularity in the literature, performance of the ratio in previous studies, and adherence to "a cash flow concept". According to this concept, the company is viewed as consisting of a "reservoir of liquid assets, which is supplied by inflow of cash and drained by outflows. The solvency of the firm can be defined in terms of the probability that the reservoir will be exhausted" (pp.79-80).

The sample consisted of 79 bankrupt companies matched by size and industry with 79 non-bankrupt firms. A cut-off score was determined for each variable to distinguish between failed and non-failed firms, and the predictive ability of each variable was measured by

applying the cut-off score to a holdout sample.

The results of his study indicated that financial ratios can predict failure better than a naive model not dependent on financial ratios. Accuracy of ratios was as high as 90 per cent, and the most successful predictor was the cash flow to total debt ratio.

Beaver (1968), aware of the limitation of using only accounting ratios, extended his study to a comparison between the predictive ability of financial ratios to that of stock market prices. Using the same sample, Beaver found that stock prices predicted failure sooner than individual financial ratios. However, the difference was rather small. The average length of time from the year of failure forecast to the failure date was 2.31 years for the stock prices and 2.45 years for the net income over total assets ratio.

An alternative approach is to use a number of ratios simultaneously. This was done by Altman (1968) who used multiple discriminant analysis to distinguish between bankrupt and non bankrupt manufacturing firms in the period 1946-1965. Using a sample of 33 bankrupt firms matched by industry and asset size with 33 non-bankrupt firms, and using a variety of methods to reduce the variable set (22 variables), he arrived at the following discriminant

function:

$$Z = .012W_1 + .014W_2 + .033W_3 + .006W_4 + .999W_5$$

where

W_1= working capital/total assets
W_2= retained earnings/total assets
W_3= earning before interest and taxes/total assets
W_4= market value of equity/book value of total debt
W_5= sales/total assets

The five-variable model using the data of the year prior to bankruptcy correctly classified 95 per cent of the total sample. The percentage of correct classification decreased to 72 per cent when data two years prior to bankruptcy was used for prediction. When earlier data were used, the predictive power of the model became unreliable.

Deakin (1972) modified Altman's model to include the fourteen ratios initially used by Beaver and modified Altman's sample selection procedure in that the non-failed firms were selected at random.

The discriminant function was developed using all fourteen variables. Although some ratios had a very small discriminant coefficient, Deakin observed a significant decrease in accuracy of classification whenever any of the ratios was eliminated. The functions were significant at level of .001 for the first three years prior to bankruptcy and at levels of .001 and .005 in the fourth and fifth years respectively (Deakin, 1972, p 174).

Deakin's model depends on the additional assumptions that the variables were distributed as a multivariate normal distribution (Deakin, 1972, p 175), but no multivariate normality test was reported in his study.

Blum (1974) adopted the same theoretical framework for variable selection as applied by Beaver (1964). He examined the financial characteristics of bankrupt firms within a cash flow framework. Blum used variability measures of cash flow and earnings as predictors of bankruptcy, and his results indicated that variability measures can help in bankruptcy prediction. The predictive accuracy was 93-95 per cent in the first year before bankruptcy, 80 per cent in the second year and declined to 70 per cent in the third, fourth and fifth years before bankruptcy.

Ohlson (1980) was the first to use logit analysis to develop his bankruptcy model. Using a very large sample of firms relative to those of other researchers (105 failed and 2085 non-failed) firms, he reported an 85 per cent classificatory power for his model. However, he expressed disappointment at being unable to match the accuracy rates in some previous studies which had used Multivariate Discriminant Analysis (MDA).

3.3.1b Empirical Studies In The United Kingdom

The above reviewed studies in the United State have suggested the approach for the research in bankruptcy which has subsequently been conducted in the United Kingdom. Studies using U.K. data are necessary for comparison purposes, as there are major differences in the accounting and economic environments, while the existence of institutional differences make it inappropriate to directly apply the bankruptcy models, such as the Z score model developed by Altman, to the U.K.

Taffler and Tisshaw (1977) applied the approach to U.K. data and developed two models for bankruptcy prediction, one for quoted manufacturing companies and one for non-quoted manufacturing companies with turnover above £1/2 million. The model for the quoted companies was developed using a sample consisting of 46 failed companies matched with 46 non failed for the period 1968-1973. The model was developed using linear discriminant analysis and resulted in the following formula:

$$Z = C_0 + C_1R_1 + C_2R_2 + C_3R_3 + C_4R_4$$

where:

C_1 to C_4 are the coefficients and are equal to 0.53, 0.13, 0.18 and 0.16 respectively.

R_1= Profit before taxation/Current liabilities
R_2= Current assets/Total liabilities
R_3= Current liabilities/Total assets
R_4= Number credit intervals
= Immediate assets-Current liabilities/operating costs excluding depreciation

The predictive ability of the model has been reported to be 99 per cent.

Later Taffler (1982), tested the validity of his model across time, using a sample of 23 failed companies and 45 solvent companies selected randomly. Unlike most earlier studies, no attempts were made to match the two groups by size, industry, or financial year nor was there an equal number of firms in each group. On the reasons for this he stated:

> "the statistical methods only require separate multivariate normality in the constituent groups from which the discriminant function is to be constructed together with equality of their variance-covariance matrices. As a result restricting the size of the non-failed sample to that of the bankrupt set only serves to restrict the total sample size and the degrees of freedom. Secondly, since, strictly speaking, to make valid inferences it is necessary for the sample group employed in the analysis to be representative of their underlying populations, the matching of continuing firms with failed firms by industry is incorrect. This does not provide for the non-failed set to be a random sample of all presently continuing industrial firms, particularly as some industries are more failure-prone than others". (p 343)

The model was made up of the following ratios: earnings before interest and taxes/opening total assets; total liabilities/net capital employed; quick assets/total assets; working capital/net worth; and stock turn-over. The classification ability of the model was very high (only one failed firm was reported to be misclassified). The second stage of the analysis incorporated a test of the multivariate discriminant model in a hold-out sample of companies failing between 1974 and 1976. The type I error was reported to be 12.1 per cent while type II error was reported to be 10 per cent.

Peel et al. (1986) introduced a number of 'unconventional' ratios based on director resignations and appointments, directors' shareholding and the time lag in reporting company accounts. Other financial ratios included in the analysis were; size; flow of funds/total liabilities; sales/total liabilities; and working capital/total assets. The sample consisted of 34 failed companies and 44 non-failed companies for the period 1974-1982. Their results indicted that size, time lag, director resignations, and flow of funds/total liabilities are always significantly different from zero with large asymptotic-value. The predictive ability of the models developed were tested using a hold-out sample consisting of 12 failed and 12 non-failed firms. The misclassification results were 16.6 per cent for the failed firms and 0 per

cent for the non-failed firms.

More recently Peel and Peel (1988) investigated how much predictive content that variables have two or more years prior to failure. Again, they incorporated non-financial variables in their multilogit model to predict bankruptcy. The time lag between a company's financial accounting year end and the date of publication of its annual accounts was considered to be an important non-financial variable which should be included in the model. Other variables such as size and the ratio of flow of funds/total liability were also included in the model. The variables were computed for each of three years before failure.

The estimate sample consisted of 79 industrial companies (35 failed and 44 healthy), all of which are/were quoted in the London Stock Exchange. The hold-out sample consisted of 27 companies (12 failed and 15 healthy). Their conclusion was that "the characteristics of failing firms differed significantly from those of healthy ones up to three accounting periods before failure" (p 317). They indicted also that the time lag variable had a considerable predictive content in all models.

Betts and Belhoul (1987) introduced the concept of financial stability measures into bankruptcy prediction

models[1]. A total sample 132 (39 failed and 93 non-failed firms) was used in the analysis. The study used twenty-nine ratios representing profitability, working capital position, financial leverage, quick asset position and level of activity dimensions, and selected financial stability measures for the same dimensions. Using multivariate discriminant analysis (MDA) they arrived at the conclusion that "stability measures make a significant contribution to linear discriminant function especially for three years before failure" (p 329). The other conclusion was that "financial stability concept does not reduce the role played by financial ratio analysis in forecasting companies failure, but is merely complementary to it" (p 332).

A number of limitations are associated with the research on corporate distress prediction. The major limitation arises from the absence of a general theory of corporate failure that can be used to specify the variables to be included in the models. Another limitation is related to the sampling procedure used in most of the studies mentioned, as most of the studies used matched samples for industry and size, though the failure rate for companies differs markedly over both of these variables.

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(1) Financial stability measures, refers to the use of more than one year's record for a particular ratio, in this study the authors used the standard deviation of the ratios as a measure of stability.

Thus, the models may not perform as well in practice as the empirical studies would suggest if these two variables are included in the analysis.

3.3.2 Bond Premium and Bond Rating Predictions

The holding of capital assets (such as Bonds) usually involves various aspects of risk. One such aspect is known as "business" risk and is associated with the inability of the holder to perfectly predict future revenues and costs of business enterprises. Therefore, actual corporate earnings can differ from expectations, resulting in unanticipated changes in capital asset prices and hence in the holders' wealth. Another type of risk is related to the existence of a high degree of cross-sectional correlation among securities' prices and returns. This type of risk is referred to as "market" risk. The risk associated with holding bonds is different, and is reflected in two widely used indicators: the risk premium on bonds and bond ratings. The following four factors are assumed to create bond risk and consequently to affect the yields to maturity of bonds:

1. Default risk. This is related to the inability of a firm to meet part or all of the bond interest and principal payment.

2. Interest rate risk. This is caused by unexpected changes in interest rates which inversely affect the market value of bonds.

3. Marketability risk. This refers to the possibility of disposing of the bonds at a loss.

4. Purchasing-power risk. This is related to loss encountered by the bondholders as a result of inflation when the purchasing power of money decreases.

The existence of risk-averse investors in the market (Sharpe, 1964) has led to the emergence of the concept of a risk premium to compensate those investors for the risks they are going to bear as a result of holding bonds. Fisher (1959) defines this risk premium as:

> "The risk premium on a bond has been defined as the difference between its market yield to maturity and the corresponding pure rate of interest. Market yield is defined as the rate of interest at which the principal and interest payments specified in the bond contract must be discounted if their present value is to equal the current market price of the bond. The corresponding pure rate of interest is defined as market yield on a riskless bond maturing on the same day as the bond under consideration". (p 298)

Fisher examined the power of a four-variable model to explain the difference in the risk premiums of industrial corporate bonds. Using a sample of US. industrial corporate bonds, and employing various least-squares regressions, he arrived at the following equation:

$$X_0 = 0.987 + 0.307X_1 - 0.253X_2 - 0.537X_3 - 0.275X_4$$

where:

X_0= The logarithm of the average risk premium

X_1= earnings variability, measured as the coefficient of variation on after-tax earnings of the most recent nine years.

X_2= solvency, measured as the length of time since the latest of the following events occurred: the firm was founded, the firm emerged from bankruptcy, or a compromise was made in which creditors settled for less than 100 percent of their claims.

X_3= Capital structure, measured by the market value of the firm's equity/par value of its debt.

X_4= the market value of the firm's bonds.

R^2, which is the coefficient of multiple determination, was reported to be 0.75. Hence the four variables account for 75 per cent of the variation in the risk premium on bonds. This indicates a reasonably good explanatory power of the model.

Little subsequent research on this topic appears to have been done. However, research has been directed to another area of bond ratings.

A large number of empirical studies have been conducted to predict ratings or rating changes using data from published accounts. Horrigan (1966) developed a model for the prediction of bond ratings. His original sample consisted of firms whose bond rating did not change during

1959-64. This sample included 201 firms rated by Moody's and 151 firms rated by Standard and Poor's. The estimated results were tested on a different sample of 130 firms which had been assigned new ratings during the period 1961-64 and 85 firms whose ratings were changed during 1961-64. Using a large set of financial ratios and applying multiple regression analysis, the model with the highest explanatory power included the following ratios: total assets; working capital/sales; net worth/total debt; sales/net worth and net operating profit/sales.

Applying different statistical analysis, and including market measures, Kaplan and Urwitz (1979) found that total assets; long-term debt/total assets and the stock beta are statistically associated with the rating of bonds. Using their logit model, they were able to classify correctly two thirds of their hold-out sample. Besides replicating the earlier results which proved that accounting data are useful in predicting bond ratings, they also found that their more complicated statistical tools did not improve the results over OLS (ordinary least square).

Bond ratings issued by rating agencies, such as Moody's and Standard and Poor's, are judgements about the investment quality of long-term obligations. Wakeman (1981) points to three sets of evidence that rating

agencies use publicly available accounting information to rate corporate bonds: (1) the explanations given by the agencies, (2) the timing of rating changes, and (3) empirical studies that attempt to explain ratings or rating changes.

Wakeman reports that an analysis of the reasons given by Moody's for changing bond ratings in the period 1974-1976 showed that accounting based reasons accounted for more than two-thirds of those changes not involving new financing.

On the timing aspect, Wakeman reports that the distribution of Moody's ratings has changed by the month over the period 1950-1976. The ratings changes are more common in May and June. This is because the majority of annual reports are published in April. The difference in the time distribution of changes was found to be significant.

More recently Belkaoui (1983) developed a model for bond rating prediction. The estimation sample consisted of 266 industrial bonds and the validation sample consisted of 115 industrial bonds, all rated B or above by Standard & Poor's. The following variable were included in the model: total assets; total debts; long-term debt/total invested capital; short-term debt/total invested capital;

current assets/current liabilities; fixed charge coverage ratio; five-year cash flow divided by five-year sum of (capital expenditure, changes in inventories during the most recent five years and common dividends); stock price/common equity per share, and subordination (0-1 dummy variables). The variable will take a value of 1 if the bond being rated is subordinated (ranked lower in security) to other debt issues.

For the estimation sample, the discriminant model correctly classified 72.9 per cent of the bond ratings. In the validation sample, the model correctly classified 67.8 per cent of the bond ratings. Therefore, it can be concluded that the explanatory power for the model is high.

There are many problems commonly associated with the above studies. For instance all of them have focused on the rating changes announced by one firm (say Moody's), without analysis of the bond ratings offered by other firms (Foster, 1986). Another problem is that the models presented did not provide a testable and explicit statement of what a bond rating represents, nor has the economic rationale for the selection of variables included been provided.

3.3.3 Credit and Bank Lending Decisions.

Another way to test the potential use of financial ratios is the examination of the use of financial statements in loan decisions. When a bank is approached with a new loan application, the decision involves more than simply whether to grant the loan or not. Other decisions include: the interest rate, the amount of the loan, the securities to guarantee the loan and the maturity of the loan. Having decided to provide the loan, the bank faces further decisions. The bank may attempt to design an early warning system to anticipate loan defaults, thus developing a model to predict loan default might be useful.

Libby (1975) assessed the use of financial ratios by bank loan officers in prediction of business failure. The sample consisted of 20 firms (10 failed and 10 non failed firms). Five financial ratios were calculated for each firm for three years before failure. They include: net income/total assets; current assets/current liabilities; current assets/sales and cash/total assets. Libby found that bank officers were able to correctly classify a firm as bankrupt or non-bankrupt within three years of the financial statements in 44 of the 60 cases (i.e. 70 per cent classification accuracy). This indicted that traditional confidence in ratio analysis for credit rating was justified.

Backer and Gosman (1979) report the result of interviews at major US banks, Dun & Bradstreet, investment banking firms, and bond-rating agencies. Their main question related to "which financial ratios have the highest priority in term loan decisions". The general finding was that as the length of the loan increased, the greater the emphasis is placed on leverage and profitability ratios and less on liquidity and turnover ratios.

Dietrich and Kaplan (1982) examined a sample of "commercial loans of a large money-centre commercial bank". The aim of the study was to develop a model which was able to replicate the judgement used in classifying loan risk. The sample consisted of 140 loans divided into the following categories: Current (109); Especially mentioned (16); Substandard (10) and Doubtful (5). They arrived at the following function that provided a high explanatory power:

$$Y_1 = -3.90 + 6.41DE_i - 1.12PC_i + 0.664SD_i$$

Where

DE_i= (long term debt+ current liabilities)/total assets

PC_i= funds from operations/(interest expense + minimum rental commitment+average debt maturing within three years)

SD_i= number of consecutive years of sales decline.

The higher the Y_i score, the higher the estimated risk of the loan. The reported classification accuracy for the above mentioned categories in the estimation sample were 93 per cent, 44 per cent, 80 per cent and 60 per cent respectively. The prediction accuracy in the validation sample for the same categories were, 94 per cent, 29 per cent, 30 per cent, and 50 per cent. These figures indicate that the linear model predicted the current category loans equally on both samples, but predicted the other three categories less well for the validation sample.

3.4 FINANCIAL STATEMENTS AND MARKET REACTIONS

Another aspect of the predictive approach mentioned earlier is based on the theory and evidence of the efficient market. The behaviour of security prices with respect to financial statement data is a widely discussed topic in the finance and accounting literature. This section focuses on the efficient market hypothesis and its implication for accounting information and policies.

3.4.1 The Efficient Market Hypothesis

A market is said to be efficient if security prices act as if they fully reflect publicly available

information, including financial statement data. Accordingly, this definition means that no investor can expect to use published information in such a way as to earn abnormal returns on his holdings. Grossman and Stiglitz (1976) based their decision on the theory of rational expectations, whereby correct expectations are formed on the basis of all the available information, including prices. A behavioural process is generated whereby more informed individuals reveal information to less informed individuals through their trading actions. Therefore, the rational expectation model that is derived produces prices that do not fully reflect all available information instantaneously.

Their conclusion was that "information is not free and efficiency in the strong form, does not exist unless there is a decrease in the information costs".

The other form of market efficiency is the semi-strong form. According to this form of efficient market hypothesis, the prices fully reflect all available information. Hence, no trading rule based on available information may be used to earn an excess return.

Tests of the semi-strong hypothesis have been concerned with the speed with which the security prices react to specific events. Some of these events examined

were stock splits, announcements of annual earnings and dividends.

Empirical evidence on these events indicates that security prices react quickly and in an unbiased way to these events.

The third form of market efficiency is the weak form. This form deals with efficiency with respect to the past sequence of security prices (e.g. the random walk hypothesis). Empirical studies using filter test, serial correlation and run tests support this hypothesis.

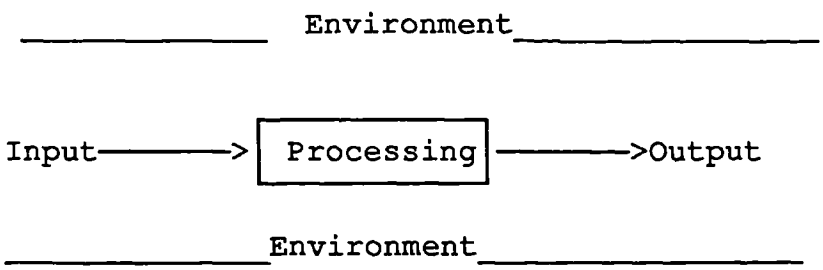
3.5 SUMMARY AND CONCLUSIONS

The above discussion has indicated that classificatory and predictive approaches in accounting have been used to evaluate accounting data. Indeed, most of the reviewed studies on prediction were intended to give information about the best accounting measure with the greatest predictive or classificatory power with respect to a particular economic event, such as bankruptcy or movement in the shares prices. Such an evaluation is needed to assist in the decision making process. Hence, using such approaches in accounting enables the accounting system to

be designed to produce relevant information which allows decision makers to achieve their goals. Beaver, et al (1968) have indicated the usefulness of the predictive approach, in that they commented:

> "Because, prediction is an inherent part of the decision process, knowledge of the predictive ability of alternative measures is a prerequisite to the use of the decision-making criterion. At the same time, it permits tentative conclusions regarding alternative measurements, subject to subsequent confirmation when the decision models eventually become specified". (p 60)

An accounting system consists of three elements as the following figure shows:



These three elements are operating independently within an environment which helps the system to function efficiently and effectively. The raw data provided by the accountant form the input into the system. The selection of the type of data needed by the different types of users represents the processing element in this system. The

information output used by groups of decision makers is the final element of the accounting system (Glautier and Underdown, 1991).

One of the most relevant applications of the predictive approach is the prediction of corporate failure on the basis of available accounting ratios. Both univariate and multivariate models have been used to help in predicting whether or not a firm is approaching default. Although this type of research has its limitations, the contribution of such research to the development of an accounting system that can operate effectively and efficiently within certain environments should not be ignored. The continuous assessment of certain ratios that were used in this type of research across different periods of time can eventually help in the development of a system of uniform disclosure for financial ratios by companies. This process of assessment is part of the environment that produces feed back to the accounting system.

CHAPTER FOUR

THEORIES OF MOTIVES FOR MERGER

4.0 INTRODUCTION

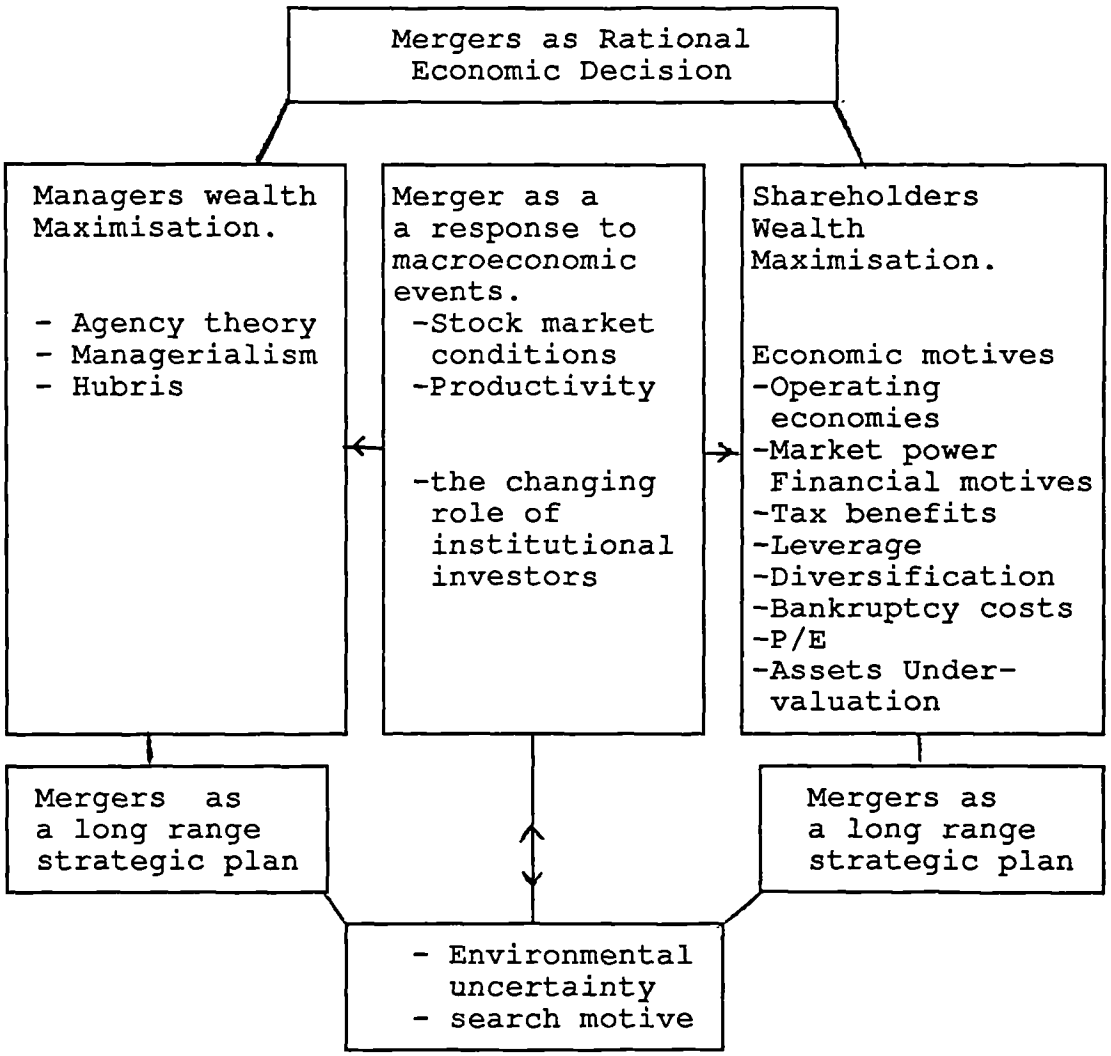
Merger motives have been the subject of extensive research conducted within the framework of three main branches of the social sciences: economics; finance; and strategic management. All three have based their arguments upon similar fundamental explanations.

Most observers agree that mergers are caused by a complex pattern of motives which sometimes overlap or compete with one another. Hence, no single unified theory explaining merger behaviour has been formulated or supported by empirical evidence (see e.g.Steiner,1975; Stewart et al, 1984; Ravenscraft and Scherer, 1987). Instead, two fundamental explanations for merger activity have emerged; (1) the shareholders-wealth maximisation hypothesis and (2) the manager wealth maximisation hypothesis. The research on merger activities has provided several motives which lend support to either of these two hypotheses. Figure 4.1 orders those motives which are discussed in this chapter along with the two main

hypotheses.

Figure (4-1)

Theories of Motives for Merger



On the basis of this analytical framework this chapter is arranged as follows: firstly, the shareholders wealth maximisation hypothesis is discussed, wherein empirical studies of merger motives which lend support to

this hypothesis are reviewed. This involves a discussion of the economic motives (operating economies and market power), and the financial motives (tax benefits, debt capacity, diversification, bankruptcy costs, P/E ratio, managerial inefficiency and assets undervaluation). The second section examines the managerial wealth maximisation hypothesis, wherein a discussion of agency theory, managerialism and hubris theories found to support this hypothesis are presented. The strategic motives for merger which give support to either the shareholders or the managerial wealth effect arguments are discussed in section three. Section four is devoted to an analysis of the macroeconomic and legislative environments which influence the different motives for merger. Finally, a conclusion is provided in section five.

4.1 SHAREHOLDERS WEALTH-MAXIMISATION HYPOTHESIS

The shareholders-wealth maximisation hypothesis has long been promoted within the economics and finance disciplines. According to this hypothesis, acquisitions are motivated by a desire to maximise the value of the firm to shareholders.

One firm will bid for another if the value placed on it by the acquiring firm is greater than the value

placed on it by its current owners. The capital value of a firm is determined by the discounted future expected earnings, so that the value (V) equals $V=P_t\ (1-r_t)/1+i)$, where P_t is the expected future earnings in time period t, i is the discount rate, and r is the retention ratio. The major emphasis of the owner wealth maximisation hypothesis is on differences in the value placed on the firm by its original owners (V_0), and the value placed on it by the acquiring company (V_1). In many cases the acquirer would place a higher value on the company than the firms' owners because they believe the expected future profitability will increase. Reasons for the higher expected value are classified as being related to economic and financial motives. The following section provides a discussion of these motives.

According to the shareholder wealth maximisation theory, acquisitions are seen as a process through which firms and their controllers are forced into value-maximising behaviour. This hypothesis predicts that the wealth of shareholders of both bidding and target firms, increases as a result of acquisitions.

4.1.1 Economic Motives and Evidence

The economic motives for merger activity that ensure the underlying rationale of shareholders wealth

maximisation have been discussed by economists, with special emphasis on its contribution to the theories of the firm. They include (A) market power; and (B) operating economies. In verifying these motives Mueller (1986), stated :

> "If firms maximise profits, mergers will take place only when they produce some increase in market power, when they produce a technological or managerial economy of scale, or when the managers of the acquiring firm possess some special insight into the opportunities for profit in the acquired firm." (p.155)

Therefore, the fundamental expectation of the economic notion for merger motives is that mergers made for any of these reasons should result in increased profitability for the acquirer and the target.

4.1.1a Market Power

The achievement of market power has long been considered the main economic justification for mergers.

Increasing market power means increasing the size of the firm relative to other firms in the same industry. Size may be useful in any prolonged battle with rivals and allows a firm to outlast its rivals, as larger firms have more sophisticated managerial teams and more resources which can be utilised in preparing the defence plan against

rivals. These assets may help to protect a firm from being acquired by other firms with whom it does not wish to be associated.

The increase in market power through mergers is of great concern for public policy makers, because it might lead to undue industrial concentration. Such an effect is expected to occur in both horizontal and non-horizontal mergers. In the US public policy holds that when four or fewer firms account for 40 per cent or more of the sales in a given market or line of business, an undesirable market structure exists. In the U.K., no such policy has been implemented, but market power is considered along with other prerequisites when a merger is referred to the Monopolies and Mergers Commission. In the Boots/Glaxo (1971-72) proposal, for example, the question arose of whether Boots could use control of a drugs wholesaler to its advantage by discriminating against other retail chemists by withholding or restricting supplies. Similarly, in the British Telecom/Mital 1986 proposal, BT's backward integration into the manufacture of telecommunication equipment through merger with Mital, a manufacturer of private automatic branch exchanges, concerned the Commission because it was thought that BT could divert business to this subsidiary and thus give BT market power which it would not otherwise be able to achieve as a regulated company.

Empirical evidence in the U.K. has indicated that increases in market power was the predominant motive in the 1920s and the 1960s merger waves (Hannah, 1976 p96).

4.1.1b Operating Economies

The traditional view of the main objective of the firm is to maximise its profits. In light of this assumption, mergers can be analysed in terms of operating gains and the effect on earnings for firms involved in the merger process. In particular, one theoretical justification is based on economies of scale (Silberston 1979).

The scope for scale economies depends on the extent to which the merging firms share common inputs and on the resources available within each firm for deploying those inputs effectively to achieve maximum efficiency at minimum cost. Hence economies of scale have been considered to be the natural goal of horizontal mergers. But such scale economies have also been claimed in conglomerate mergers (Brealey and Myers, 1984).

Economies of scale may be obtained from reduced costs, or from avoidance of market imperfections achieved by the amalgamation of the two firms. The potential

economies are sometimes subdivided into real and financial economies. Real economies occur when improvements in operations within the firm are achieved, whereas financial economies depend upon lower input costs resulting from the advantages of mass buying, including the achievement of a lower cost of capital. According to Scherer et al (1975) scale economies are most likely to arise in horizontal mergers where a number of similar activities are brought together. Technical economies may be achieved at the plant level by integrating the manufacture of related products across all production units in the enlarged firm. Reallocation of people, equipment and overheads over a larger number of units of output can thus be obtained at a lower marginal cost. Thus, in manufacturing operations, heavy investments in plant and equipment typically produce such economies. For example, such economies can be significant for many products, especially in heavy industries such as the oil and chemical industries, where the cost of obtaining new plant and machinery through the acquisition of an existing operator is less than the cost of this equipment in the market place.

However, the existence of multidivisional firms suggests that mergers between such firms would rarely be justified purely on the basis of financial and operating economies alone. Empirical studies by Kitching (1967) Scherer et al. (1975), and Stewart, et al. (1984) have

demonstrated the existence of administrative economies of scale for marketing expenses, advertising expenses and research and development.

In addition, Williamson (1968) contended that vertical mergers in particular can take advantage of market imperfections by eliminating the search and transaction costs associated with providing goods or services. These costs can accrue in the absence of forward or backward integration.

The attributes of backward integration are the relevant savings in production that may be achieved through mergers. These savings may be classified into two categories: those relating to the level of efficiency with which the production of the firm's existing products can be organised, and those relating to the price for supplies. The first category includes the advantage of being able to have the required supplies available at the right time. Savings coming under the second category relate to the ability of a company to produce its own supplies at a cost lower than that which could be obtained in the market place.

Forward integration is inspired by a desire to assume full control of the product at all levels of production until it reaches the consumer. (i.e. control of

marketing and distribution channels).

Business combination via merger is one way of achieving growth which can contribute to the profit maximisation goal of a corporation. Growth can be achieved internally through the process of expansion by reinvesting earnings. That is, a company may grow by reorganising and re-applying its existing financial and operating resources, by conducting research and planning directed toward developing new products or manufacturing processes, by obtaining additional finances, by developing new markets or by constructing new facilities. For some activities, internal growth may be advantageous. For others, careful analysis may reveal sound business reasons for pursuing external growth. Factors favouring external growth through mergers and acquisitions include the following:

- Some corporate objectives could be achieved more speedily through an external acquisition.
- The cost of building an organisation internally may exceed the cost of acquisition.
- There may be an opportunity to complement the production capabilities of other firms.

Amongst other explanations that have been offered by economists to explain mergers is the life cycle/growth hypothesis. This hypothesis indicates a non-steady state firm growth pattern which occurs as a result of policy or environmental changes (Mueller, 1986). He hypothesised the

existence of 'young' firms in terms of time labs between certain events, for example where a technological or commercial breakthrough had contributed to speeding up growth and profitability. At this stage, the interests of managers and shareholders combine to maximise feasible growth. Later, as the exceptional circumstances fade, the optimum growth rate for shareholders gradually declines and may become negative. According to Mueller, mergers are an obvious way to avoid the slowdown in growth that product maturity brings. Assuming that acquiring firms can operate their acquisition at roughly the same efficiency levels as the acquired firms previously experienced, growth through mergers can be achieved at only the transaction costs of consummating the merger, including the premium paid to the acquired firms' stockholders (Mueller 1986).

4.1.2 Financial Motives and Evidence

The economic motives for merger are linked to the operational activities of the acquirer or the target or to the relationship (or lack of it) that exists between them. However, the financial motives are linked to the implications of the merger on the value of a firm measured by the expected future cash flows that, when discounted at a discount rate adjusted for the risk of activities, gives the current value of the firm.

To be able to achieve financial benefits from merger the acquirer has to make a return at least equal to the risk-adjusted required rate of return and probably more. Thus, as is the case with the economic theory, the profitability of the combined operation would be expected to increase.

The primary interest in studying financial motives for mergers has therefore been to investigate the effect of mergers on the parties involved in this process (i.e. the shareholders of the acquired firm, the shareholders of the acquiring firm and other securities holders).

This issue has been investigated by determining whether certain proclaimed motives for mergers have any validity. For example, do mergers lead to a significant tax saving? Do they result in a large increase in debt capacity?.

The empirical literature dealing with mergers has indicated the existence of the following motives: (1) Tax incentives; (2) leverage benefits; (3) bankruptcy costs; (4) diversification; and (5) price-earning magic.

4.1.2a Tax Incentives

Tax saving has been considered as a motive for mergers. The extent to which taxes contribute to the merger and acquisition process depends on the taxation system in operation at the time of the completion of the merger.

Essentially, there will be tax benefits whenever a firm (the acquirer) is able to offset profits and capital gains against losses incurred by another firm (the acquired) for corporation tax purposes. In the U.K. the sale of tax loss companies became a booming industry in the 1960s and early 1970s. This tax benefit was demonstrated in the Allied Breweries/J. Lyons acquisition. At the time of the bid the debt figure for Lyons was £218 million, and its equity net worth was £59 million. When Allied Breweries made the bid in 1978 for the amount of £65 million Lyons was making profits equal to £33 million before debt interest. Allied was thus able to take advantage of the Lyons' losses because of its ability to pay off debt. Losses were then offset against Lyons' profits, which gave Allied a means of using the Lyons' tax losses as it could borrow at the rate available prior to the acquisition. Interest payments on Allied's loan were deducted from Allied's profits, and using the loan, Lyon's debt was then paid off and the carry forward from tax was offset against Lyons' profits.

However, the introduction of the Taxes Act in 1970 and the Finance Act of 1984 has restricted the scope of this form of tax relief (for more information about the effect of the introduction of the 1984 Act and other tax implications on mergers and acquisitions in the U.K., refer to Chapter Eleven, Cooke, 1986).

There are other tax benefits which can motivate merger activity. Private shareholders may prefer the capital gains that might accrue from acquisitions to profit distribution from internal growth where capital gains are taxed more lightly than dividends. Managers pursuing shareholder benefit as their main objective will use excess funds to expand externally 'via mergers'.

4.1.2b Leverage Benefits

Financial synergy can be achieved through increases in the debt capacity of the combined firms or by making use of the target's unused debt capacity. Borrowing costs tend to decline with the size of a firm. The larger the combined corporation provides lenders with greater protection, thus allowing the combined firm to have a higher debt-to-capital ratio. Mergers, especially conglomerate mergers, generally result in more stable operating earnings, which make it easier for outside

investors, especially lenders, to monitor and evaluate the firm. This, it is said, will result in lower borrowing costs, or perhaps increased debt capacity. Lewellen (1971) states:

> "..should two companies merge, the likelihood of disaster at the same aggregate scale of lending must decline, as long as the relationship between the annual cash flows of the combining enterprises is such that, prior to merger, default on their respective loans did not always occur simultaneously".

The use of internal rather than an external finance, can provide the means by which lower costs of capital for post merger investments in the acquired firm's industry are achieved. In a study of how the future value of the firm is affected by the method of payment and the capital structure of the firms involved in the merger activity, Myers and Majluf (1984) argue that the use of internal financing can have an advantage over external financing when the acquiring firm's managers have more information about the value of the acquired firm's assets than outside investors, and exploit this information by choosing to acquire the firm in question. They develop an information based theory which suggests that value is created in mergers when firms with low financial leverage acquire firms with high financial leverage....

> ..and about which investors have little information. Such firms sell at a discount from their average potential value. A tender offer made directly to the slack poor firms shareholders at a price above the discounted value but below the potential value makes both the bidder and the target's shareholders better off ex ante. (p.219).

According to the above authors, the value is created because slack-rich bidders can pursue the profitable but unfunded investment opportunities of the previously slack-poor target.

Bruner (1988) provides evidence which lends support to Myers and Majluf's theory. The evidence in his study suggests that target firms have higher financial leverage at the time of merger than firms in the control group.

4.1.2c The Growth Resources Imbalance Hypothesis

Palepu (1986) has operationalised the above argument by indicating that two types of firm are likely targets: high-growth, resources poor firms (Myers and Majluf, 1984), and low-growth, resources rich firms. Therefore, the availability of growth and resources are important variables in determining whether a firm is likely to become an acquisition target. That is, a firm which has excess cash but lacks profitable investment opportunities

is likely to be an attractive acquisition target, or a firm which suffers from constraints of capital to invest in profitable projects may choose to merge with a cash-rich firm.

In these situations, merger could then be a strategy for managing the growth-resources imbalance which affect such firms. Mergers may be pursued initially for other reasons such as tax saving or increase in debt capacity which might eventually contribute to rectifying the problem of growth-resource imbalance.

4.1.2d Diversification

Diversification has been considered as the main motive for conglomerate merger, since the pooling of imperfectly correlated income streams will produce a superior risk/return asset to the individual streams. The implication is that although overall profits will not be increased, they should be stabilised by bringing together unrelated businesses. Accordingly, if economies of scale could not be achieved from conglomerate merger, the stabilisation of the profit stream should produce an economic advantage through risk reduction. However, this argument cannot be true unless a restriction is imposed on the ability of individual stockholders to form his own diversified portfolio, since the advantage of risk-pooling

can be achieved by individual shareholders' portfolio diversification (Levy and Sarnat, 1970). However, the existence of transaction costs, the cost of acquiring relevant information and the existence of other elements which make the market inefficient restrict the individual's ability to diversify his own portfolio, thus making diversification through merger feasible.

4.1.2e Bankruptcy Costs

Another financial motive for merger related to the above argument is to avoid or reduce bankruptcy costs. Shrieves and Stevens (1979) suggested that the avoidance of bankruptcy risk and the savings resulting therefrom can have a direct effect on the combined value of newly merged conglomerates. The savings due to the avoidance of bankruptcy would have to be balanced against the costs associated with the consummation of the merger. The legal and administrative costs associated with bankruptcy could reasonably be expected to be greater than those associated with merger. The event of Bankruptcy would result in the loss of possible tax loss carry-overs of the failing firms that would be available in the event of a merger. Shrieves and Stevens also indicate that a firm's management would have less incentive to operate efficiently during the period of bankruptcy proceedings than would the

management which remains following a merger (this may of course be a unique US factor which is not applicable in the U.K. due to the differences in bankruptcy law between the two countries). Fear of liquidation of assets at uneconomic prices might also induce shareholders to accept an artificially lower value for their holdings than could normally be expected in other circumstances. In a US study Shrieves and Stevens apply Altman's model to 112 acquired firms and 112 non-acquired firms chosen on a paired sample basis with the acquiring group. The mergers occurred during the period 1948 to 1971.

Their results for the year prior to merger show that Altman's model predicts that 17 of the 112 firms in the merging group were near bankruptcy. This ratio is much greater than the failure rate of large firms over the period, (15.2 per cent vs 2.8 per cent).

4.1.2f Price /Earning Magic

Lintner (1971) and Mead (1969) have argued that when a firm acquires another firm with lower P/E than its own, the market often evaluates the combined earnings of the two firms at the higher P/E of the acquirer. This will then produce an instantaneous capital gain. The assumption underlying this hypothesis is that the market mechanically applies the buying firm's P/E ratio . If there is an

eccentricity in share prices then dealing will occur until the profits from the eccentricity disappear. Conn (1973) has realised the existence of such gains, and states:

> "only two considerations are necessary for successful P/E differential merger strategy. First, in order to achieve instantaneous increase in EPS the acquiring firm's P/E ratio must be greater than the acquired firm's prior to merger. Second, in order to achieve an increase in price per share the post merger combination must be evaluated at least at the weighted average of merged firm's PE ratios" (p 756).

Conns' results indicate that those firms which are the most attractive acquisition targets are those with a lower P/E ratio. Empirical studies in the U.K. have supported this theory. Tzoannos and Samuels (1972) examined acquired and non acquired firms between 1967 to 1968, and found that the higher the P/E ratio, the smaller the chances a firm would be taken over.

More recently, Gowland (1990) has acknowledged the existence of P/E gain. He indicated that there is always an above-average return to be made by buying companies with low P/E ratios.

The above discussion indicates that unlike the economic motives for merger, financial motives for merger do not assume gains accruing from costs savings resulting from economies of scale, more efficient distribution and/or

a temporary drop in the target's share price. Nor do they assume the industry relationship between the target and the acquirer to be important. Thus financial motives for mergers can justify conglomerate takeovers which the economic theory would find much more difficult to justify.

4.1.3 The Efficiency Theories Of Merger

Another line of financial research has investigated the time period during which the excess returns, if any, from mergers are received.

In the US Mandelker (1974), and Ellert (1976) studied the returns for both the acquired and the acquiring firms. They found that very substantial increases in cumulative average residuals (CARs) of acquiring firms were reported during the period well before the merger takes place or is announced. With regard to acquired firms, both Mandelker and Ellert found that their CARs are significantly positive for a period lasting for 7 to 12 months subsequent to the actual merger date. Langetieg (1978), Asquith (1979), Dodd (1980) and Asquith (1983), have all studied the wealth effect of merger activity. All have reported that during the period well before the merger, the acquired firm's shareholders suffer losses, while the acquiring firm's shareholders earn positive abnormal returns. Commencing approximately six months

prior to the merger, a significantly positive performance trend emerges for acquired firms. However, their evidence on acquiring firms for the same period was weak and inconsistent. Langetieg indicates losses, while Asquith (1979, 1983) reports essentially zero abnormal performance.

Firth (1976) provides similar results for U.K. data. He found that share prices for acquired firms have risen over the twenty-one trading days preceding the announcement. However, no change in the returns to shareholders of the acquiring firms were noted during this period.

The finding of positive CARs for the acquired firms in the months preceding the merger in almost all the above mentioned studies have been interpreted as indicating that the acquired firms have had unique resources whose value are realised to a greater degree by merger. However, the existence of negative residuals, in the years and months running up to the period when information about the mergers becomes available, have lent support to the proposition that acquired firms have been operating at low levels of efficiency. This financial under-performance is interpreted as a potential consequence of managerial inefficiency. According to this managerial inefficiency hypothesis, acquired companies' management does not

operate to its potential, and mergers are often seen as a method of replacing inefficient management.

The inability of shareholders to perfectly monitor and control the investment decisions of managers could be related to several factors. Firstly, managers of large public corporations are in general subject to only minimal scrutiny. Boards of directors give managers great freedom in selecting investment projects, and do not use negative stock market reactions to investment or acquisition announcements as definitive indicators of long-run value consequences. Secondly, shareholders with well diversified portfolios have little interest in monitoring management decisions of individual firms. Management ownership of shares may be used as a means to control their activities, but in most large corporations top managers own only a small stake. The structure of a public corporation allows the board of directors to relinquish decision making power to corporate managers who are directly responsible to the board of directors and not to the shareholders. Thus ownership is separated from control.

Marris (1964) has developed the argument of managerial inefficiency within a theory of "the market for corporate control". In this market firms struggle for control of inefficiently managed firms using take-overs and mergers as a vehicle. Thus, mergers are seen as an

economical way of removing bad management, reorganising corporate structures, and improving allocation efficiency in the corporate sector.

Varian (1988) approved this argument of disciplining inefficient managers, he stated

> "It is generally agreed that [takeovers] are a primary manifestation of the market for corporate control. That is takeovers serve as an incentive device for management to perform in the stockholders interests. If the current managers fail to maximize values a takeover offers a mechanism whereby shareholders can replace the current managers with managers who offer better performance" (p 3).

An alternative explanation for the finding of positive CARs for the acquired firms in the months preceding the merger could be related to insider dealing by the people who plan the acquisition. The management team have information about a forthcoming merger, thus could have caused an increase in trading volume and a rise, at least for the company to be acquired, in share price. Manne (1966) has indicated that access to inside information is one of the important perquisites managers have. The knowledge that the shares of the future target firm will soon rise is a valuable piece of information. Thus, one possible explanation of why managers engage in mergers that have no benefit to their shareholders is that the mergers provide opportunities for possible gains for themselves

from insider information. The Guinness scandal is a prominent example of this phenomenon of insider dealing in the U.K., although this cannot be generalised to apply in the case of all mergers, nor can the extent to which these profits influenced management decisions be determined. The hypothesis that speculation of this type may have been a significant factor in some mergers is certainly consistent with the evidence provided here, and the more general phenomenon that merger waves accompany stock advances.

4.1.4 The Undervaluation Hypothesis

Some studies suggest that target's assets are undervalued. One indication of such undervaluation is the existence of large differences between the market value of a firm's shares and the replacement value of its assets. This is caused when certain market conditions prevail. Tobin (1969) proposed that the undervaluation be measured by the q ratio, which is the market value of the shares divided by the replacement cost of net assets. Marris (1964) suggests that the lower a firm's q ratio the greater its vulnerability to being acquired. A lower q ratio means it is cheaper to buy the shares of the firm and gain control over its assets rather than going to the market to buy the machinery and other assets.

Inflation is one market condition which might affect the q ratio of firms. The increase in inflation rates leads to an increase in the replacement costs of net assets. Hence this motive for merger is expected to be predominant when inflation is high. Such a link has been identified as contributing to the merger activity in the US in the 1970s (Bartley and Boardman 1984, and Weston, et al 1990). In the U.K., Buckley (1972) indicated that the q ratio was a good signal for identifying potential victims, but the reasons for undervaluation were not indicated.

Another cause of undervaluation occurs when a company underutilises its assets or when its management does not operate at full potential. This then becomes an aspect of the inefficient management theory. An alternative explanation offered for the undervaluation of the firm is the asymmetric information hypothesis (Bradley 1980). According to this hypothesis, the acquirers have inside information which the general market does not have, and which make them place a higher value on the shares than that currently prevailing in the market. Thus, the firm becomes a bargain to a potential acquirer.

4.2 MANAGEMENT WEALTH-MAXIMISATION HYPOTHESIS

The management wealth maximisation hypothesis postulates that managers of bidding firms undertake acquisitions to maximise their own wealth at the expense of shareholders wealth.

In the US the empirical evidence on the wealth effect of merger activity has indicated that most of the gain from merger activity accrue to the shareholders of the acquired company, (Mandelker, 1974; Dodd, 1980; Asquith, 1983). The evidence on the returns to acquiring firms indicate that the shareholders of acquiring firms either gain a small and statistically insignificant amount (Mandelker, 1974; Langetieg, 1978; Asquith 1983), or as indicated in the study by Dodd (1980), lose a small but significant amount from the date of the announcement of a merger bid. This suggests that managers are not pursuing a profit maximisation policy as far as the shareholders of the acquiring firms are concerned.

More recently Bradley et al, (1988) have studied the effect of tender offers on the share price of the target and bidder firms. The study covered 236 successful tender offers between 1963-1984. They reported that for the period 1963 to June 1968 the returns to targets were 19

per cent. For the sub-period 1968 to 1980, they were 35 per cent , and for the period 1981 to 1984 the returns were 35 per cent. The returns to acquiring firms are reported to be slightly above 4 per cent for the 1960s. The returns were 1.3 per cent for the period covering the 1970s. For the 1980s, the excess returns were reported to be negative at slightly under 3 per cent.

In the U.K. a number of studies have been undertaken to investigate the profitability of mergers. Their conclusions are sometimes conflicting, which may be due to the differing methodologies used by researchers to sample differences, or to the time period covered by each study. Franks, Broyles and Hecht (1977) used the market model to study the wealth effect of mergers on the shareholders of the acquiring and the acquired firms involved in mergers during the period 1955-1972. They found significant positive gains to the acquired company with no offsetting loss to acquirers. Using the same methodology, Firth (1979, 1980) studied merger activity in the U.K. in the years 1969-1975 and found that shareholders of the acquired company gain from the merger, whilst the shareholders of the acquiring company lose.

Using a sample of 39 mergers from the period 1974-1976, Barnes (1984) found that the shareholders of the acquiring firms gain a small amount around the merger

announcement date but suffer a net loss during the subsequent six months. Dodds and Quek (1985) used a larger sample for the same period and found residuals around the announcement date similar to those of Franks et al (1977), and contrary to those of Barnes. Recently a comprehensive study has been conducted by Franks and Harris (1989). They studied the merger activity in the U.K. in the years 1955-1985, and found, on average, that the U.K. mergers create shareholder wealth with large acquired premiums around the merger announcement date, and zero or modest gains to acquirer shareholders.

Therefore, the evidence from the US is similar to the evidence from the studies undertaken by Franks et al (1977), and Franks and Harris (1989). However, there is some conflicting evidence which suggests that both parties gain from acquisitions.

The general conclusions are that most of the gains accrue to the acquired firms' shareholders, and that zero or insignificant gains accrue to the acquiring shareholders. This has led to the conclusion that mergers are most likely to be motivated by maximisation of management's wealth. One way managers' wealth may be maximised is explained by the size maximisation hypothesis. Penrose (1959), Reid (1968) and Mueller (1969), among others, argue that a direct link exists between merger

activity and size maximisation behaviour by the acquiring firm's management. Malatesta (1983) has conceptualised the existence of such a link, he notes that:

> "..., the size- maximising hypothesis predicts that at the margins merger attempts are negative net present value investments for acquiring firms. This does not preclude the possibility that successfully completed mergers increased acquiring-firm shareholder wealth. However, if all acquirers, behave as size maximizers, merger prices will be bid to the point where merger attempts, on average, have a negative impact on acquiring firm shareholders wealth" (p.127).

Amihud and Lev (1981), however, argued that managers pursue acquisition strategies to reduce the variability of the firms' earnings, since their income and the risk associated with this income are related to the total risk of the firm.

Mueller (1986) provides a comparison of merger activity motives and their implications across several countries, he concluded that:

> "The evidence is broadly consistent with the hypothesis that managers pursue corporate growth or other objectives that are not directly related to shareholder welfare and economic efficiency. The hypothesis can explain why managers of acquiring firms undertake mergers providing no benefits for their stockholders; why managers of acquisition targets vigorously resist bids which would greatly enrich their stockholders" (p.212).

A related argument put to explain merger motives is the existence of conflict of interests between the shareholders and the management of the firm, or what is known as agency problems. Jensen and Meckling (1976) have argued that the agency problem arises when managers own only a fraction of the shares of the firm. This partial ownership has been believed to make managers work less hard than otherwise, and to try to consume more perquisites (e.g. luxurious offices, company cars) because the shareholders will bear a high proportion of these costs. This argument can be related to dispersed ownership, which is the case in large public companies where there is insufficient incentive for individual owners to employ the significant resources required to control the behaviour of the managers.

Various mechanisms have been offered to solve this problem, including contractual arrangements, the operations of the labour market for managers and the threat of take-over (Manne 1965). Fama (1980) proposed that the manager, in an attempt to avoid acquisition and the probable loss of jobs, may act to maximise his own wealth whilst at the same time operating the firm at a level of efficiency which will guarantee only a marginal return for the shareholders.

Another aspect of the Agency problem is the manegerialism theory put forward as an explanation for conglomerate mergers (see Copeland and Weston 1984). According to this theory, managers are motivated to increase the size of their firm as manager's compensation has been assumed to be a function of size (Mueller 1969). Reid (1968) and Singh (1971) have also indicated that mergers seem to be the way managerial growth could be achieved.

The empirical work in the U.K. and in the US did not support this theory. Francies (1980), using a questionnaire type of research which was sent to managers in 18 large U.K. companies, concluded that:

> "Although our managers did report satisfaction for the growth of their company,..... their primary sources of satisfaction do not include the other factors commonly expressed by managerialism writers, such as security, status, prestige and service to employees, customers and the community. Moreover whatever interests they have in the fast growth of their company these are not seen to be in conflict with profit maximising corporate objectives. Profits and growth are both pursued, growth in profit is given larger priority than growth in sales or assets". (p 62)

The validity of Francies' study is questionable for two reasons. First, questionnaire methodology has a built in bias, as it provides limited and sometimes

unreliable answers. Second, the study covered the period 1974-1976 which was a period of low merger activity and managers may have responded differently in a take-over boom.

Roll (1986) presents a behavioural explanation for the takeover phenomenon. He hypothesised that managers commit errors in evaluating merger opportunities and that they keep up their search for target firms. According to Roll, they are infected by excessive pride and arrogance (hubris). So if a takeover turns out to be unprofitable, hubris can explain why managers make bids even though past experience would suggest that these represent positive valuation errors. Therefore, the takeover phenomenon is a result of hubris on the part of the bidders.

While Roll has developed his argument using empirical evidence on the wealth effect of merger activity, Morck et al (1990) and Seyhun (1990) provide direct tests of the hubris hypothesis. Morck et al test a specific version of Roll's hypothesis which indicates that managers of bidding firms overpay for targets because they overestimate their ability to run them. They suggest that the hubris hypothesis predicts that "worst acquisition are made by well performing firms, because their managers are the most likely ones to be infected by hubris"(p.33). Their empirical evidence indicates that bad acquisitions are

prompted by managerial objectives, but that hubris is not the sole factor influencing these bad decisions.

Seyhun (1990) examined the stock transactions of top managers of bidder firms for their personal holdings in the firm as indication of their motivation regarding corporate takeovers. No evidence has been found which indicates that bidder managers knowingly overpay for target firms.

Limmack (1990) pursued the above analysis by an investigation of the factors affecting the post-performance of U.K. bidders. The author's main interest was to determine if bad acquisitions (measured by the amount of the return to shareholders) were driven by managerial objectives.

Using univariate and multi-regression analysis, he investigated a sample of 363 U.K. firms which were involved in acquisitions over the period 1977-1986. For these firms he identified the wealth changes which are bid related. Using measures of growth, relatedness, profitability, size, date of bid and target premium, he provided an analysis of mean bidder returns using individual variables and also for two sub-periods, one for those bids announced in the calendar years 1977-1980 and another for those announced in the calendar years 1981-1986. At the second stage of the

analysis he used multiple regression analysis. The results indicated a significant negative relationship between the growth of bidding firms and subsequent acquisition-related returns (i.e. the higher the firm's growth rate the less is the return achieved from acquisition). This has been used to offer support to the argument that bad acquisitions are indeed related to the pursuit of managerial objectives. The evidence was ambiguous regarding the argument that bidders with superior performance records achieve superior acquisition- related returns. The use of two sub-periods produced the following conclusion, when Limmack states:

> "The results identified a significant difference in the pattern of returns between the two sub-periods. The change in economic climate and regulatory framework appears to have led to an improvement in the efficiency of operations of the market for corporate control in the United Kingdom. There does also appear to be some as yet undetected relationship between the health of the economy and the returns from acquisition (p.29).

4.3 STRATEGIC MOTIVES

According to business policy and strategic management research, from the standpoint of the buyer, the company engaged in a program of expansion that involves mergers/acquisitions, mergers/acquisitions offer an alternative form of growth to internal investment. For such

companies, the merger/acquisition decision then becomes a function of long-range strategic planning. The long-range strategic plan which defines how a company will utilise its resources to achieve its objectives must specify the contribution of mergers/acquisitions to the overall plan. The literature of strategic management postulates the existence of two motives for merger that are considered part of this long-range strategic planning; (A) merger as a response to environmental uncertainty; (B) mergers as search motives.

4.3.1 Environmental Uncertainty

The decisions, operations and performances of organisations are inseparably bound up with the conditions of their environment. Various researchers have developed the idea that a merger is an attempt on the part of an organisation to reduce uncertainty and manage the surrounding environment (see Cyert and March (1963), Newbould (1970), Aaronovitch and Sawyer (1975), and Pfeffer (1972)).

Cyert and March (1963), amongst other organisational theorists, maintain that environmental uncertainty is a major factor in determining a firm's

strategy. They argued that organisations deliberately attempt to avoid uncertainty "our studies indicate quite a different strategy.... organisations avoid uncertainty, they avoid the requirement that they anticipate future reactions of other parts of their environment by arranging a negotiated environment" (1963, p.119).

Other authors suggest that organisations actively search for ways of reducing this uncertainty which involve attempts by the organisations to manage their dependence on other firms. Pfeffer (1972), indicated that organisations when attempting to reduce resources interdependence, have to absorb that interdependence either by acquiring competitors who are operating similar resources or markets (horizontal merger) or by acquiring suppliers and customers who are vertically related to the organisation in the input and output exchange relationship. Conglomerate mergers, which involve diversification into other activities, have also been used to reduce interdependence. He stated that:

> "First, companies may employ mergers as a means for integration, by merging either forward or backward in the production process. This is an attempt to deal with symbiotic interdependence... second, companies may purchase the competition as a way of reducing competitive or commensalistic interdependence... Finally, firms may attempt to handle interdependence through a merger or growth strategy of diversification" (p 384).

Applying diversification through merger could prove to be a successful strategy especially if changes in the environment call for rapid adjustments. Vertical combinations of existing firms may offer significant positive benefits. This could be achieved through economies of scale or utilisation of unused managerial capacity.

Although mergers are used as a means to solve the problem of organisational interdependence, mergers may also be pursued to achieve the objectives of growth, and growth per se may be part of a strategy of dealing with the environment.

4.3.2 Merger as a Search Motive

Cable (1983) has developed the theoretical argument that conglomerate mergers may occur as a form of corporate search. According to Cable a firm may undertake acquisitions mainly to obtain information on potential investment opportunities, "gaining information on potential investment opportunities can be sufficient motive for the acquisition of a firm, at least in conglomerate merger cases" (p 17). It has been argued that firms are continuously engaged in research activity to expand their investment opportunity sets, that is, investment projects capable of implementation which expand the acquiring firm's

optimal portfolio of investment activities. This is said to be achieved under the assumption that knowledge of all production opportunities cannot be taken for granted and that information is not costless to acquire. Thus firms utilising mergers in their search for investment opportunities have to employ certain criterion to locate satisfactory projects at the minimum cost possible of achieving this objective. Generally speaking this criteria can include a definition of the fields in which to search. This will then provide a basis for building a list of companies for preliminary examination. This may confine the search to one or more groups of industries, to companies making specific products, to companies operating in a particular geographical location, or to companies of a particular size.

Criteria concerning the industry and the location are relatively easy to develop and quite specific. Other criteria could be more complicated and require further investigation. For example, in determining the size criteria, a company needs to consider other factors such as profitability and opportunity costs. In other words the most appropriate acquisition targets are most probably to be found where existing profitability is high, therefore, less profitable firms find it more sensible to acquire relatively higher profit firms. For this to be possible the acquiring firm will generally need to be relatively

large. However, although the firms which are generating high profits are likely to have a well developed management information system which can be utilised to identify possible target firms, it may be that pursuit of small targets may not be worthwhile because the opportunity costs of management time are too great to warrant application to very small activities, however promising these may be. Hence it is expected that acquisitions have to reach some threshold size, for large firms is proportionally larger than it would be for smaller firms.

That notwithstanding, theoretical and empirical work on the characteristics of acquired firms have hypothesised that **the likelihood of acquisition decreases with the size of the firm.** This is based on the argument that costs associated with the absorption of the target into the acquirer's organisation, as well as the costs associated with fighting a take-over battle, are likely to increase with the target size (Palepu 1986).

On the basis of the above discussion, firms resorting to merger in their search for investment opportunities can eventually benefit from economies of scale, or financial synergy if they pursue a vertical or horizontal merger type, or can fulfil future managerial objectives if they were to become involved in conglomerate activities. The above review indicates that some merger

theories could be affected by macroeconomic events like share prices and economic profitability. For example, P/E gains are more achievable when the market is performing well. Optimistic expectations which are required to bring about this magic are most likely to be present in such a climate. The following section will elaborate on this issue.

4.4 MERGERS AND MACROECONOMIC EVENTS

The literature review provided in Chapter Two on the history of mergers indicates that there has been overt waves of merger activities in the U.K. These merger activities were closely linked to several motivational factors (discussed above) including economies of scale, market power, tax factors, managerial inefficiency and so on. These are, no doubt, amongst the important motivational factors underlying merger activities. However, there are also other significant factors specific to particular circumstances which can be related to a certain economy or to a certain industry.

This study examines merger activity with specific reference to the experience of British firms for the period 1980-1986. Therefore, it is necessary to shed some light on the circumstances of the British economy in order to grasp

the "particular circumstances" within which this merger activity occurred.

In the early 1980s the U.K. economy had been buffeted by turbulent conditions. The first half of the decade witnessed two major problems: 1) unfavourable economic conditions (recession, import competition, and an overvalued pound- a deliberate policy of the newly elected Conservative Government to control inflation) and 2) the so-called "British Disease" (weak management, overmanning, wage inflation, low productivity and investment and industrial unrest) (Reynolds 1990).

Industries that previously constituted the mainstay of the UK economy- like steel, shipbuilding, textiles, and metal manufacturing- had declined in importance. Unemployment had risen to unprecedented levels particularly in the manufacturing industry which had witnessed a poor industrial record over the period. The trade balance in manufacturing fell into deficit for the first time since the industrial revolution (Reynolds, 1990). Effectively, the 1980-1 recession eliminated about 15 per cent of manufacturing capacity. Table 4.1 charts the course of profitability for manufacturing and commercial companies since the early 1960s. The table shows that the pre-tax rate of returns on trading assets declined significantly reaching a very low level by the end of the 1970s, before

recovering quite strongly at the beginning of 1984.

Table (4.1)

Rate of Returns Before Interest and Tax at Current Replacement costs

All industrial & commercial firms			Manufacturing firms	
Year	Gross	Net	Gross	Net
1960	11.4	13.1	12.0	14.5
1970	8.9	8.9	7.9	8.0
1972	9.3	9.5	8.0	8.1
1974	6.3	5.2	5.2	4.0
1976	5.9	4.4	4.6	2.9
1978	8.4	7.9	6.5	5.9
1980	7.4	6.4	4.7	3.1
1982	8.1	7.5	5.7	3.6
1984	10.2	10.7	5.7	4.8
1986	9.7	10.0	7.1	7.2

Source: Reynolds (1990).

With the restraint of low profitability removed after 1982, British companies had the funds to adopt a growth strategy via external or internal expansion. The choice between external or internal expansion is affected by many factors including transaction costs, market growth, share prices, technology, competitive forces and the cost and availability of managerial and financial resources (Peacock and Bannock, 1991).

Another factor considered to be important in influencing merger activity is the level of share prices. King (1989) indicates that takeover activity in the United

Kingdom is positively correlated with the level of the stock market. Peacock and Bannock (1991) also support this argument. They explain that such a relationship between share prices and merger activity exists because 'simply business people pursue expansion by acquisition most actively when profit prospects and market sentiment are favourable' (p.21). Rising stock values are important in the takeover process because they give an indication of the expectation of increased future profits and optimism about the future. It can also be argued, that after a period of recession, some companies emerge in better shape than others and these companies race ahead in stock market terms. Consequently a dispersion of stock market values persists which encourages the companies that are doing well to use their highly valued shares to buy up those companies doing less well.

Another aspect of rising stock markets could be related to the fact that it is easier to raise funds to finance the acquisition especially if share issues were to be used to partly or totally finance the acquisition. Figure 4.2 shows the positive relationship between stock market prices and the expenditure on acquisitions. It can be seen that the expenditure on acquisitions tends to rise when share prices increase, and tends to fall when share prices fall.

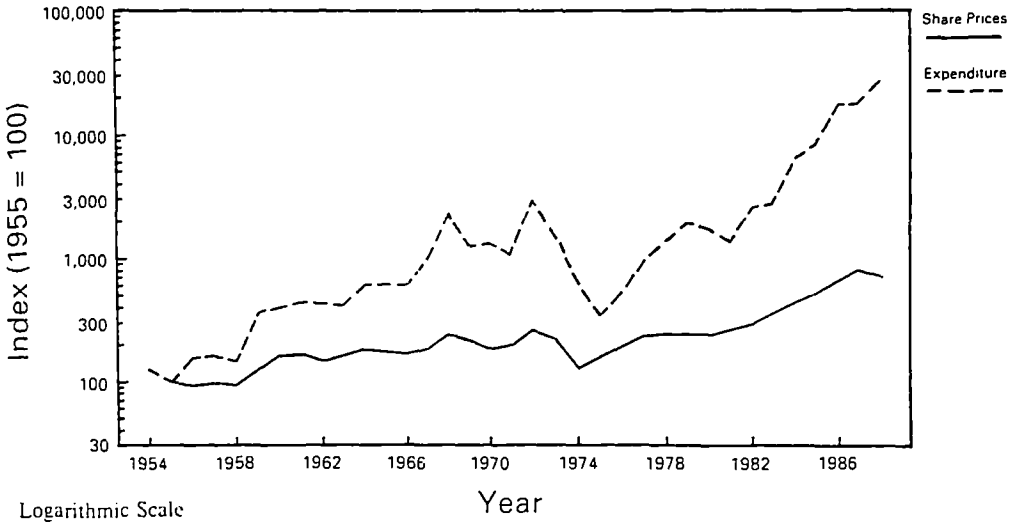


Figure 4.2 Expenditure on acquisitions and share prices, U.K. 1954-1988, Source Bannock 1990.

Another important factor which must be considered is the changing role of institutional investors as shareholders in individual companies.

The role of financial institutions as corporate shareholders changed between the 1960s and the 1980s. Institutional holdings in the equity market accounted for less than 35 per cent in 1969, but by the end of 1985 their holdings had risen to 60 per cent (Cosh et al, 1989).

As a key shareholders, their decisions are critical in determining the outcome of takeover battles. For these institutions, the short-term financial rewards from increased share prices in a takeover bid determines their behaviour 'which may be rational'(Gray and McDermott,

1989). This might be related to the fact that many financial institutions operate short holding periods and prefer to capitalise on shor-term gains rather than regarding the longer-terms performance of companies. They fear losing clients if short-term gains are forsaken regardless of expectations of longer-term profits. The interest of institutions in short-term investment strategies compared to the investment strategy of individual shareholders can be explained by what Heiner (1983) has referred to as the competent-difficulty gap. This gap is a measure of the spread between an economic actor's competence to make a rational decision and the level of difficulty of the decision problem to be solved. This suggests that the wider this gap, the more economic actors fall back on simplifying rules of thumb when making decisions. With respect to share portfolios, one of these rules of thumb might be to base buy and sell decisions on the basis of short-term earnings prospects. Such a rule of thumb may constitute a seemingly reasonable strategy on the part of shareholders with limited competence in making difficult decisions in a complex environment characterised by substantial noise. The significance of this observation is that the competence-difficulty gap is probably wider in the case of individual shareholders than institutions. It can be argued that institutions have greater inference capabilities than individuals. Institutions may benefit from economies of scale in information-gathering and

analysis. They employ teams of share analysts who are able to draw on sophisticated computer-aided information networks when evaluating the future prospects of the share price of the company under analysis; whereas individuals do not benefit from such level of expertise. Moreover, financial institutions are professional decision-makers who have learned from experience what to look for in a firm, while individuals are amateurs whose investment decisions display an element of gambling (Shiller, 1988). Thus, due to their greater competence, the investment decisions made by institutions may be based on a more rational assessment of the firms' potential than investment decisions made by individuals.

The conservative government's more relaxed attitude towards mergers, evident since 1983, has played a part. Proposed mergers are now assessed primarily on their competitive aspects, with other matters relevant to the public interest (e.g. regional and social issues), given less weight than previously (Elliot 1990).

These factors, in addition to the recovery in the UK economy since 1984 have made mergers and acquisitions a more attractive route for growth than internal expansion. Involvement in domestic and international mergers by U.K. companies increased from £2.3bn in 1983 to £5.5bn in 1984 and to £7.1bn in 1985.

4.5 SUMMARY AND CONCLUSIONS

This chapter discussed the existing hypotheses for merger motives. Three different sets of motives have been identified. They include those motives found to promote the shareholders wealth maximisation argument, which have been classified into economic and financial motives. The second set of motives have been found to promote a managerial wealth maximisation argument. These include; agency theory, managerialism, and hubris. The third set of motives has been identified in the strategic management discipline. They have been seen as part of long range planning decision applied either, to avoid environmental uncertainty or, simply applied as a search for investment opportunity. However, these motives cannot be found in all mergers. They are sometimes interrelated and sometimes they overlap. For example, adopting a diversification strategy is achieved by increasing the number of subsidiaries of the firm. Gaining access to a new market will avoid environmental uncertainty on the one hand, but it could also be seen as a move by the management team to pursue their own objectives such as increasing the size of the sales and assets, or gaining control of a larger empire (Halpern 1983).

Some motives are unique, and require certain types of managers who have absolute power over merger decisions (e.g. hubris theory). Other motives require favourable

legal and tax environments. For example, Prais (1981) indicates that the changes in Corporate Tax favouring retentions introduced by the Labour government in 1965 encouraged companies to use their money to buy other firms. The introduction of the 1987 corporate tax rate of 35 per cent and the income tax rate of 27 per cent by the Conservative government lessened the importance of tax benefits as a motive for merger.

Economic growth is also considered to influence the occurrence of merger activity. The rapid growth in the economy makes firms more optimistic about the future, and could lead to their attempting to quickly increase potential capacity (i.e. merger with an existing firm). Aggregate profitability increases have also been considered among the macroeconomic factors which can affect the motives for merger. The increase in profitability could affect acquisitions in several ways. Increasing profitability improves the ability of firms to finance mergers because it increases the value of their stock and also increases their debt capacity. On the other hand this increase in profitability and the improving economic conditions can help managers to satisfy personal needs, as their controllers (the shareholders) are enjoying the security brought about by the optimistic general economic outlook. However, they might pursue bad acquisitions because they have overestimated the future prospects for

merger success.

Rising stock markets are also considered to influence the merger activity. Like the increase in companies' profitability, they increase optimism about the future.

On the other hand, some companies (likely to be the large, or the well managed) can catch up more quickly. This could be reflected in their market value- during the transitional period from recession to recovery. Others could still suffer and have their market valuation decline, encouraging companies that are doing well to acquire them.

The analysis of theories of merger motives provided in this chapter have also indicated that each type of merger (horizontal, vertical or conglomerate) presents a different collection of motives for merger. For example, in horizontal mergers where the nature of the businesses are similar, and where features such as size, type of technology, or culture are compatible, synergistic motives are predominant and could be easily established.

The discussion provided in this chapter has also acknowledged the existence of two sub-periods within the study period from 1980-1986. Prior to 1979 the United Kingdom economy had been subject to extremely high

inflation for a number of years. However, 1979 saw the coming to power of a Conservative Government working to apply an economic policy that reduced the inflation level and worked towards a free market policy. In the aftermath, a period of minor recession occurred before the economy recovered, at least as reflected in the Stock Market Boom of the mid-1980's.

This could have affected the number of firms acquired, the attitude of the acquiring firms and their reasons for making certain acquisitions. For example, acquiring firms for P/E magic is more likely to be achieved by bidders when the market is performing well. The optimistic expectations which are required to bring about this magic are most likely to be present when market conditions are favourable. The managerial growth maximisation objective could be achieved more easily with a stable economy and a rising stock market. In such a market the profitability of firms, especially large ones, will increase. This will make the relatively smaller firms seek protection from being acquired by themselves increasing their size through merger.

The review of merger theories indicates that no generally accepted single theory of merger exists. At best, some of the merger theories suggest certain company attributes as important considerations in merger decisions.

Among these attributes are; profitability, activity, leverage, liquidity, market valuation and growth.

The attributes listed above may be measured by more than one variable or financial ratio. The various merger motives, however, provide little or no help in selecting a specific variable or financial ratio for use in prediction models. This study has considered the above mentioned attributes in relation to merger decisions, and incorporated additional variables found to be important in prior studies. These studies are reviewed Chapter Five.

CHAPTER FIVE

PRIOR STUDIES ON ACQUIRED FIRMS' CHARACTERISTICS

5.0 INTRODUCTION

This chapter provides a comprehensive review of the previous empirical work on the financial characteristics of firms involved in the acquisition and merger process. In the first section the discussion is devoted to the empirical work that has been conducted using U.K. data. The second section present a review of the work that has been done in other countries. This includes studies in the US, Canada and Australia. An evaluation of the methodology of these prior studies is undertaken in the final section and comparison are drawn with the present study.

5.1 STUDIES BASED ON U.K. ACQUISITIONS

The financial characteristics of acquired and non-acquired firms have been considered, at least in part, in most of the research work on mergers in the U.K. Of particular importance are the studies of Newbould (1970), Singh (1971), Buckley (1972) and Kuehn (1975).

5.1.1 Newbould Study

Newbould (1970) investigated the mergers and acquisitions which occurred during the period 1967-1968. Using a case study/questionnaire type of research, he investigated 310 horizontal mergers. The main theme of his study was the attitude of management towards merger activity. To develop this theme, Newbould analysed financial and economic motives for merger activity during this period. Among the financial motives for mergers that were analysed were the price earning ratio and the valuation ratio for firms involved in merger activities. The results from this analysis must be tempered with the sampling procedures and methodology. For example, using a sample size of 38 firms, the interview results indicated that of the acquired companies, the price-earnings ratio is lower than that of the acquirer. However, in contrast to other studies, Newbould found that in a sample of 74 firms involved in mergers, the acquired firms did not have a lower valuation ratio (i.e. the ratio of market value to book value of the firms' equity). He commented:

> "The valuation ratio has not been found able to offer any explanation of the incidence of mergers,either in indicating those firms which receive bids, those which make bids, or in explaining the incidence of merger activity over time. Perhaps this is another example of the excess rationality imputed by economists into the actions of management" (p 107).

5.1.2 Singh Study

Singh (1971) analysed acquisitions in the United Kingdom during the period 1954-1960. Ten financial variables were selected as predictor variables. Nine of these were found to be significant predictors: (1) pre-tax return on total assets; (2)post tax return on equity; (3) dividend return; (4) pre -tax rate of return; (5) liquidity; (6) gearing; (7) retention ratio; (8) growth of total assets and (9) valuation ratio.

The analysis was carried out in two phases: First, discriminant functions were separately estimated for five industries; (food, electrical engineering, non-electrical engineering, drink, and clothing and footwear). All the acquired and the non-acquired firms were used in estimation. The full set, as well as several subsets of variables, were listed. In the second phase of the evaluation, the acquired firms from all industries were pooled. Each acquired firm was matched by a control firm nearest to its size from the same industry. The pooled sample was used to establish a number of discriminant functions. The analysis was done using short term (one and two years) and long term (three and six years) records of firms. Singh found that acquired firms tended to have low growth, low profitability and low valuation ratios when compared with non-acquired firms. Singh indicated that

profitability and size were the most important discriminators and not the valuation ratio. However, for firms of the same size, he concluded:

> "it is not on the whole easy to discriminate between taken over and non-taken over firms on the basis of their multiple characteristics" (p 121).

5.1.3 Buckley Study

Buckley (1972), unlike Singh, relied on univariate analysis and focused on mergers and acquisitions of quoted companies made during 1971 where the consideration exceeded £2.5 million. He found that they had low valuation ratios, declining or static earnings and low price- earnings ratio in comparison to the appropriate industrial average, and that there was a slight tendency toward undergearing.

5.1.4 Kuehn Study

Kuehn (1975) studied mergers and acquisitions of British firms. All the firms that were merged from 1957 through 1969 in 67 industries were included in his sample, and no matching procedure was applied in the selection of the non-merged firms. Certain classes of companies were omitted; those remaining consisted of those in the broad category of "domestic commercial and industrial companies".

The main focus of Kuehn's study was Marris's (1964) hypothesis that the valuation ratio of a firm is inversely related to the probability of its take-over. Other financial variables were chosen to represent five dimensions which Kuehn believed were important in the determination of the probability of a merger. They are: (1) size; (2) profit; (3) retention; (4) liquidity and (5) growth.

The study was implemented in two stages: The first stage involved the estimation of linear probability models for each of the 67 industries into which the firms were grouped. Kuehn believed that there might be a correlation between the valuation ratio and other variables (the correlation between the variables was not reported), and so estimated two linear probability models for each industry group. One included the valuation ratio and size variables, and the other included the retention ratio and liquidity. Kuehn's conclusion from this analysis was that the valuation ratio is the major variable in determining the likelihood of a take-over.

To overcome the limitation of the linear probability model, the second stage of the analysis included the use of a probit methodology. He used a weighted least squares technique for estimation. The results of this analysis were markedly different from those

of the first stage. The valuation ratio, profitability, growth and retention ratios were found to have highly significant coefficients in the respective univariate probit models. Size and liquidity were omitted from this analysis. The failure of Kuehn to pool the variables and to use multivariate probit analysis made his results less useful, and no classification accuracy was reported for his study.

5.2 NON U.K. STUDIES

5.2.1a Simkowitz And Monroe Study

Simkowitz and Monroe (1971) used linear discriminant analysis (LDA) to study conglomerate US targets in the year 1968. The sample consisted of 23 acquired and 25 non-acquired firms. Using stepwise discriminant analysis, seven out of 24 variables entered the final (LDA) model. These were: (1) Price earning ratio; (2) market turnover of equity shares; (3) dividend pay-out ratio;(5) three year percentage changes in equity; (5) sales; (6) a dummy variable for negative earnings and (7) three years average common dividends to last year's common equity. The model was statistically significant and correctly classified 82.6 per cent of the acquired and 72 per cent of the non-acquired firms in the estimation

sample. The model achieved a 63.2 per cent accuracy in classifying the hold-out sample of 23 merged and 64 non-merged firms.

5.2.2 Stevens Study

Stevens (1973) attempted to distinguish merged firms from non merged firms for 1966 based upon differences in the financial characteristics. He argued that the Simkowitz and Monroe (1971) results were affected by multicollinearity and a biased stepwise discriminant analysis procedure.

Unlike Simkowitz and Monroe, who drew their non merged firms randomly, Stevens matched merged and non merged firms according to the size of their assets. This matching by size was based on the belief that "size is an important consideration in mergers because acquired firms tend to be smaller than their buyers"(p.150). The sample used consisted of 40 firms acquired during 1966 and 40 control firms.

Stevens used factor analysis to reduce the number of variables from twenty to six variables. The final discriminant function included leverage, profitability, asset turnover, and liquidity. The (LDA) model correctly

classified 67.5 per cent of the hold-out sample, which included 20 merged and 20 non-merged firms matched by size. The model was statistically significant and correctly classified 85 per cent of the target and 50 per cent of the control from the estimation sample. The study was criticised by Monroe (1973) for not taking the industry effect into account. Nevertheless, Stevens did obtain a greater classification accuracy than Simkowitz Monroe (1971). This improvement in the results might be related to the use of two-year averages which could have reduced random fluctuation in the financial characteristics of sampled firms. However, as a result of his research design, Stevens was unable to draw conclusions concerning size effects of the acquired firms, he stated:

> "These findings imply that financial characteristics alone provide a means by which acquired firms can be separated from others. Therefore, one can argue that, regardless of the stated motive for merger, financial characteristics either are explicit decision variables or directly reflect non-financial reasons for acquisition". (p 157).

5.2.3 Harris et al. Study

The aim of the Harris et al (1982) study was to determine if the financial characteristics of acquired firms in the 1974-1977 period differed markedly from those of non acquired firms. Probit analysis was employed to

estimate the probability that a firm would be acquired. While recognising the importance of non-financial variables, such as concentration of firm ownership, market share, industry concentration, and advertising intensity, the researchers utilised a large number of accounting variables in their analysis. A group of 17 variables was subsequently selected, based on the motives for merger.

Combinations of variables were used to conduct the probit analysis, such that various sets of variables were found useful. The variables included; (1) working capital /total assets; (2) total liabilities/total assets; (3) Long term liability/total assets;(4) sales/total assets; (5) P/E ratio; (6) operating income/sales; (7) natural log of total assets and (8) operating income/total assets. Harris et al. used both two-year and five-year data in their study, but the results were similar. They also normalised the variables by industry averages, but found that only one such variable, total liabilities/total assets, was useful for the prediction of merger likelihood. This suggests that a normalisation of variables for industrial effect is not important. No classification or prediction accuracy was reported in their study.

A unique feature of this study was the use of the population ratio of the number of acquired firms to that of non-merged firms in analysis. The researchers argued that

"sample designs such as that employed by Stevens that use equal-sized samples of acquired and non-acquired firms when the underlying population is not in such an equal ratio may produce seriously misleading results" (p 226).

5.2.4 Dietrich and Sorensen Study

Dietrich and Sorensen (1984) viewed mergers as external investments and thus applied a net present value approach in selecting their discriminant variables. The probability of a firm being acquired was said to be a function of the following financial variables: (1) P/E ratio; (2) earnings before interest/sales; (3) Long term Liabilities/total assets; (4) earnings before interest/interest; (5) dividend/earning; (6) capital expenditures/total assets; (7) sales/total assets; (8) current ratio; (9) market value of equity and (10) trading volume of common stock. The variables were measured by the percentage deviation from the industry averages. Data from five years were used for all of the non-merged group, while one year data was used for the merged firms.

Logit analysis was used to estimate the probability of a merger. The logit model correctly classified 92.54 per cent of the sample. When the variables were reduced to five, the accuracy in the classification fell slightly to 89.55 per cent. The predictive power of the model was 91

per cent for the hold-out sample, which consisted of only six merged and 16 non-merged firms.

The results from this study should be viewed with care for many reasons: First, the researchers have used different age data for acquired and non-acquired firms (one-year data for the acquired and five-year data for the non-acquired). Hence the financial information used for the second group has been affected by a wider range of economic events than that of the second group. This makes the results inconsistent. Second, the use of a very small hold-out sample, only six merged and 16 non merged, may have upwardly biased the classification accuracy, which can be said to be high.

5.2.5 Palepu Study

Palepu (1986) has developed a model to predict take-over targets. He estimated a binomial logit model with the independent variables selected on the basis of a set of several stated hypotheses on the determinants of a firm's acquisition probability. He calculated the estimates from a sample of 163 targets and 256 non-targets. The conditional maximum probability method was employed. Using this methodology he provided the result for four models. For the first model, he used the following variables; return on

equity, industry dummy, size, market to book value, price-earnings ratio, growth, liquidity, and leverage. The second model used the last three variables (Growth, liquidity, leverage) which were combined to produce a dummy variable to assess the growth resources imbalance hypothesis. The average excess return as a measure of profitability was used with another model and the return on equity as a proxy measure of profitability was used in the fourth model. The likelihood ratio index for the four models ranges between 6.95 per cent and 12.45 per cent. The likelihood ratio statistic is statistically significant for all four models.

Palepu concluded that while the estimated model is found to be statistically significant, its explanatory power is quite small. However, he indicated that this is because the set of independent variables included in the model is not an exhaustive set of all possible variables. The conclusions, which are based on the limited set of variables considered, cannot therefore be interpreted to imply that targets are unpredictable from all public data.

5.2.6 Belkaoui Study

Belkaoui (1978) attempted to distinguish acquired Canadian firms from non-acquired using financial ratios. The non-acquired firms were matched with the acquired by

industry and size. Four groups of accounting ratios were considered; (1) the non-liquid asset group; (2) the liquid asset to total asset group; (3) liquid asset to current liabilities group and (4) the liquid asset turnover group. Belkaoui assumed that bankruptcy and take-over are economic events affecting particularly inefficient firms. As such he used the same 16 variables that had been used in Beaver's (1966) bankruptcy study. However, as mentioned earlier, firms merge for many other reasons than simply to improve efficiency. Nevertheless, Belkaoui achieved an 85 per cent classification accuracy when the data of three years prior to merger was used, although the data from other years did not classify very well. His findings might suggest that Canadian firms merged mainly for efficiency reasons. Belkaoui adopted Altman's (1968) method to distinguish mergers from non- mergers. A firm was classified as a merger if its Z-score exceeded the cut-off point. The main drawback of the Belkaoui study is the use of a small sample (50) and (22) firms in the analysis and the hold-out samples, respectively, which made the findings less easy to generalise.

5.2.7 Rege Study

Rege's (1984) study was aimed at predicting take-overs of Canadian firms. Five accounting ratios were used

in the analysis. They were: (1) liquidity; (2) leverage; (3) pay-out ratio; (4) activity ratios; and (5) profitability. He concluded that financial ratios based on historic accounting could not differentiate between companies which were likely to be taken over and those which were not likely to be taken over.

5.3 SUMMARY AND CONCLUSIONS

The above review of previous studies indicates that it is difficult to provide direct comparisons between the results they provided. This is related to many factors including:

First; the time periods covered by the studies vary. The most recent was the 1976-1977 period in the Harris et. al (1982) study. The most recent time period covered in the U.K. was 1971 in the Buckley (1972) study. Publications to date show that the merger activity in the 1980s has not yet been studied. As noted earlier, the business environment in which mergers occur has been quite different in the 1980s, due to economic and political changes. Consequently, the merger pattern of the 1980s needs to be explored.

A second point is the inconsistency in the age of

up to six years prior to merger. The findings concerning the usefulness of data of different ages are also inconsistent.

A priori, data taken immediately prior to the event should result in a better prediction. However, Harris et al. (1982) reported similar classification results for two-year and five-year data. Belkaoui (1978) found the greatest prediction accuracy for his three-year data rather than the one-year to five-year data. Singh (1971) however, observed that short-term records had a higher classification accuracy than long-term records.

In this study the averages of two, three, four and five years of data will be used to develop five different models. This is due to the fact that the trend in the financial ratio is important rather than the absolute value.

In addition, different criteria have been used for the selection of non-merged firms. Some studies matched non-merged firms with merged firms by one or more criteria such as (1) year of event, (2) size, (3) industry, and (4) fiscal year-end, while other studies did not use any matching criteria. Although, matching by industry is found necessary, as noted by Rege (1983). However, the matching by size in Stevens (1973), Belkaoui (1978) and Rege (1984)

was unnecessary, because size itself has discriminant power when used as a predictor variable,as reported by Kuehn (1975).

In this study the non-acquired and acquired firms' industry were matched to the greatest extent possible, but no matching by size was attempted.

The final and most important difference between the previous studies is the use of various sets of predictor variables. The variables used were mainly accounting measures plus a few non-accounting variables, such as P/E ratio, market value of equity, and share trading volume. Since there has been no single unified theory to guide the selection of predictor variables for classifying mergers, most prior studies based their selection of variables on one or more of three criterion; (1) they have been used in previous studies; (2) there was evidence that they might be important; or (3) their logical soundness. There are however three exceptions, Belkaoui (1978), who adopted a bankruptcy approach, Dietrich and Sorensen (1984), who applied an NPV approach and Palepu (1886), who selected the variables on the basis of a set of several stated hypotheses of merger motives.

In this study the financial variables will be included as proxy measures for certain economic and

financial hypotheses. These hypotheses will be discussed in detail in the following chapter.

The examination of the above studies indicates that it is not possible to drew a final conclusion about merger motives, and the reasons for merger. However, one can draw the conclusion that there are certain financial variables that differentiate between the acquired and the non-acquired groups of firms, and that such variables will change over time. As all the above U.K. studies have examined the merger activity in the sixties and early seventies this study will extend the scope of these earlier studies and provide an analysis of the financial characteristics of firms involved in the acquisition process in the eighties. Hence, this study will indicate whether there have been any changes in merger motives, by examining the changes in the financial characteristics of the acquired and the non-acquired firms.

CHAPTER SIX

RESEARCH METHODOLOGY AND DESIGN

6.0 INTRODUCTION

In the previous chapters, the existing and relevant literature on merger motives was reviewed. This review then provided the basis for the development of the research methodology which is hereby presented to fulfil the research objectives developed from the literature.

This chapter is arranged as follows: firstly, a review of the reasons for the research and the main problems identified is presented. The hypotheses for the study are set out in section two. The third section is devoted to an elaboration of the research design, whereby a description of the research design and its purpose, the time horizon of the study and the sample design and data collection procedures are provided. The alternative statistical techniques for data analysis are described in section four.

6.1 RESEARCH PROBLEM

The main objective of this study is to provide answers to the following two questions:

What was the financial profile of U.K. firms acquired during the period 1980-1986?

Does this profile of financial characteristics of the the observed firms provide a useful criterion for identifying those firms with a high probability of subsequently being acquired?

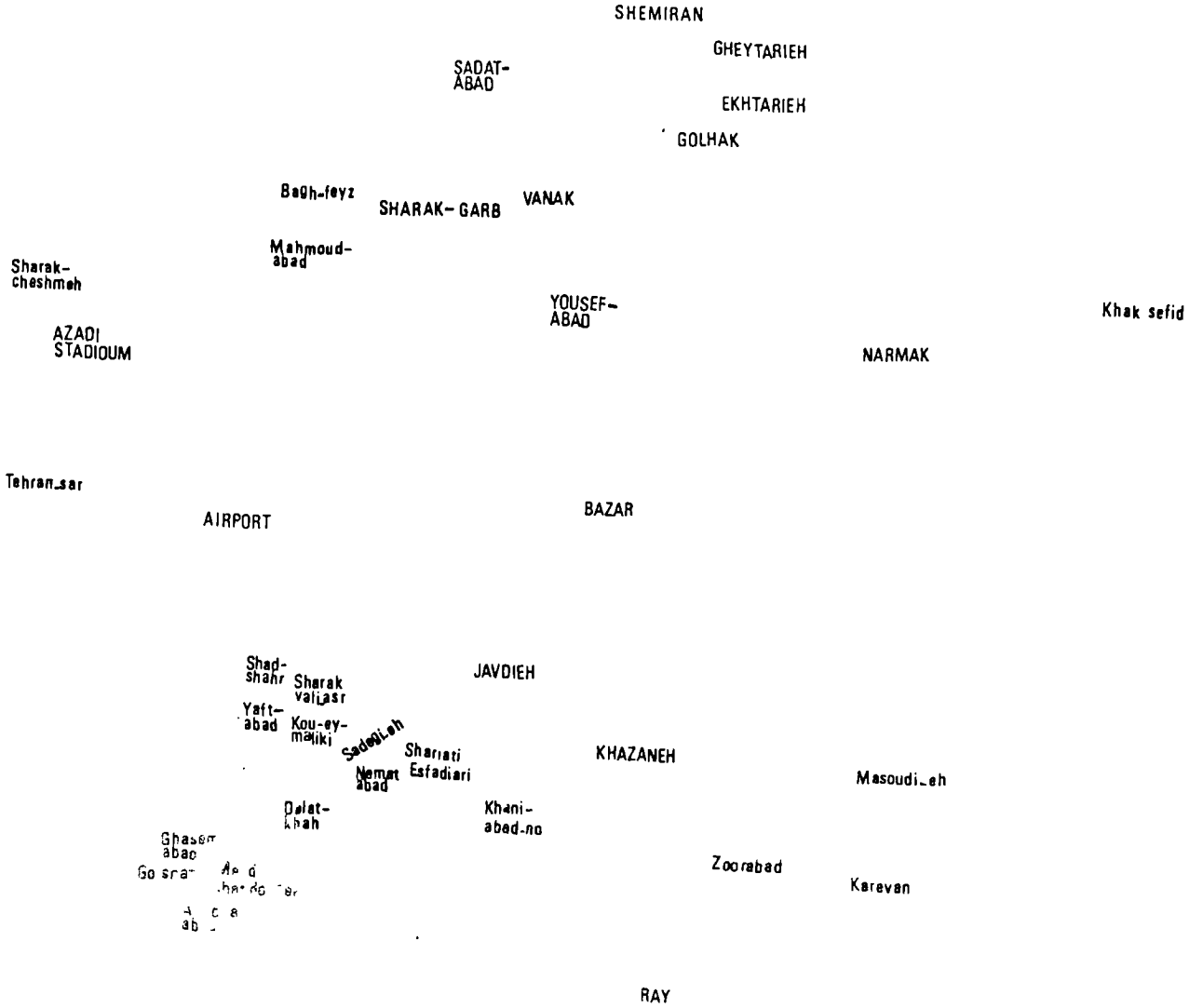
To answer these questions the different motives for mergers that have emerged in the finance, economic and strategic management literature have been reviewed in Chapter Four.

The theoretical review of merger motives has highlighted the fact that the merger decision is not based on one single motive but rather on how well the proposed merger would satisfy the various objectives determined by the parties involved. That is, mergers depend upon what the acquiring firm is looking for and what the acquired is offering. Hence not only are the characteristics of the acquired firms important in the selection process but the acquiring firm's characteristics are also important. However, arriving at general conclusions about the characteristics of the acquired firms can offer valuable

insights when developing a theory of mergers and should also provide important information to public policy makers. Hence, this study will limit itself to the acquired firms characteristics, and will examine those theories and hypotheses which suggest **direct firm attributes** for the specification of merger classification models. These hypotheses are:

- The inefficient management hypothesis.
- Asset undervaluation hypothesis.
- Price- earning ratio hypothesis.
- Financial synergy hypothesis.
- Firm size hypothesis.
- Growth resources imbalance hypothesis.

Some of these hypotheses have been investigated for firms that were acquired during the 1960s and early 1970s. However, as explained in Chapter Two, the merger movement of the 1980s differed considerably from that of the earlier periods (e.g. with regard to the size of premium paid to the acquired companies and the size of those acquired, the changes in merger rules, the development of different ways of fighting unwanted mergers, and the dynamic nature of the current merger wave). This has led to the belief that firms are being acquired for different reasons than was the case during earlier periods, and that the use of accounting and market information can successfully identify the acquired


SHEMIRAN
GHEYTARIEH
SADAT-
ABAD
EKHTARIEH
GOLHAK
Bagh-feyz
SHARAK-GARB
VANAK
Mahmoud-
abad
Sharak-
cheshmeh
YOUSEF-
ABAD
Khak sefid
AZADI
STADIOUM
NARMAK
Tehran-sar
AIRPORT
BAZAR
Shad-
shahr
Sharak
vali-asr
JAVDIEH
Yaft-
abad
Kou-ey-
maliki
Sadeqieh
Shariati
Esfadiari
KHAZANEH
Masoudi-eh
Nemat
abad
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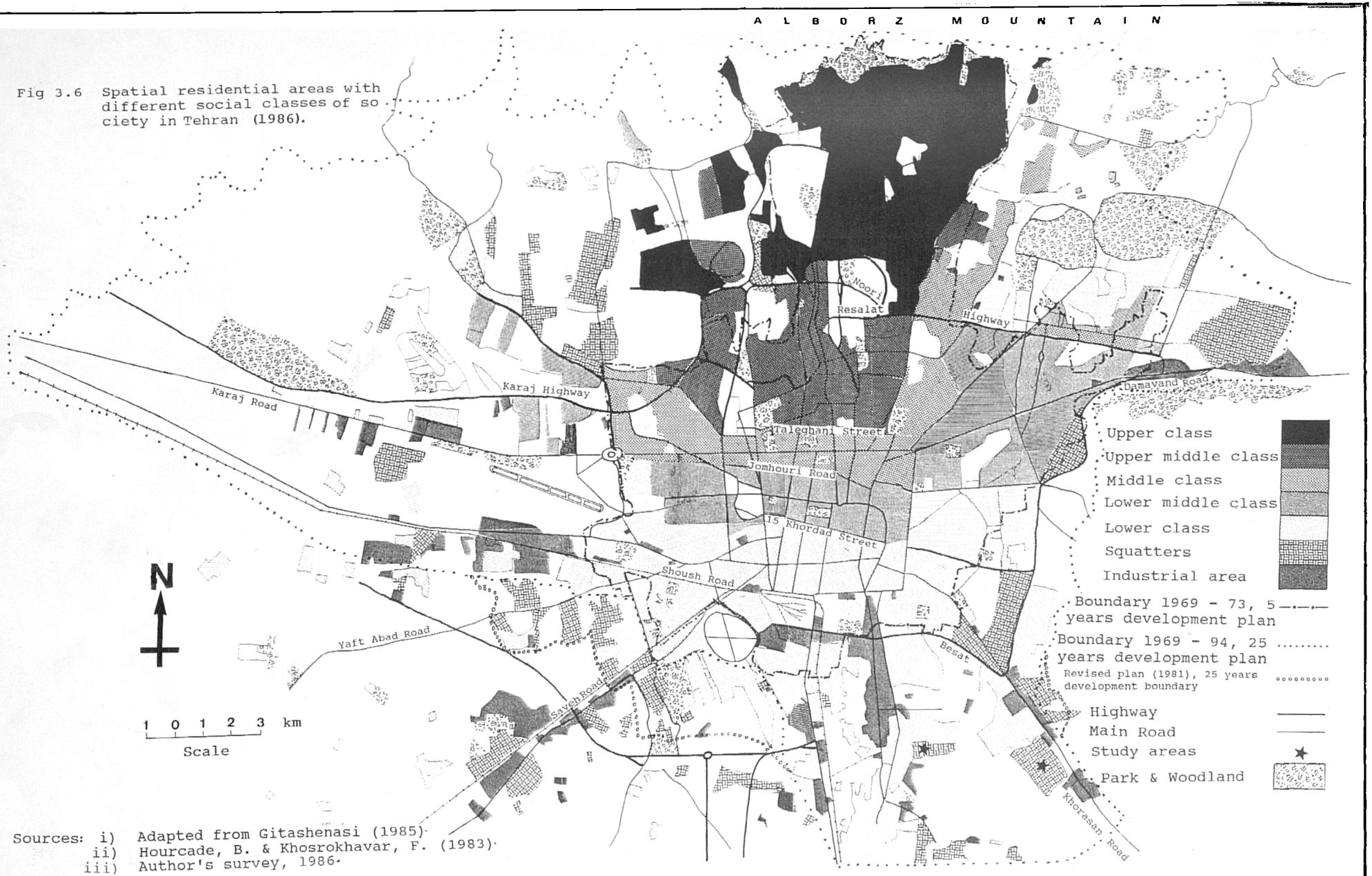
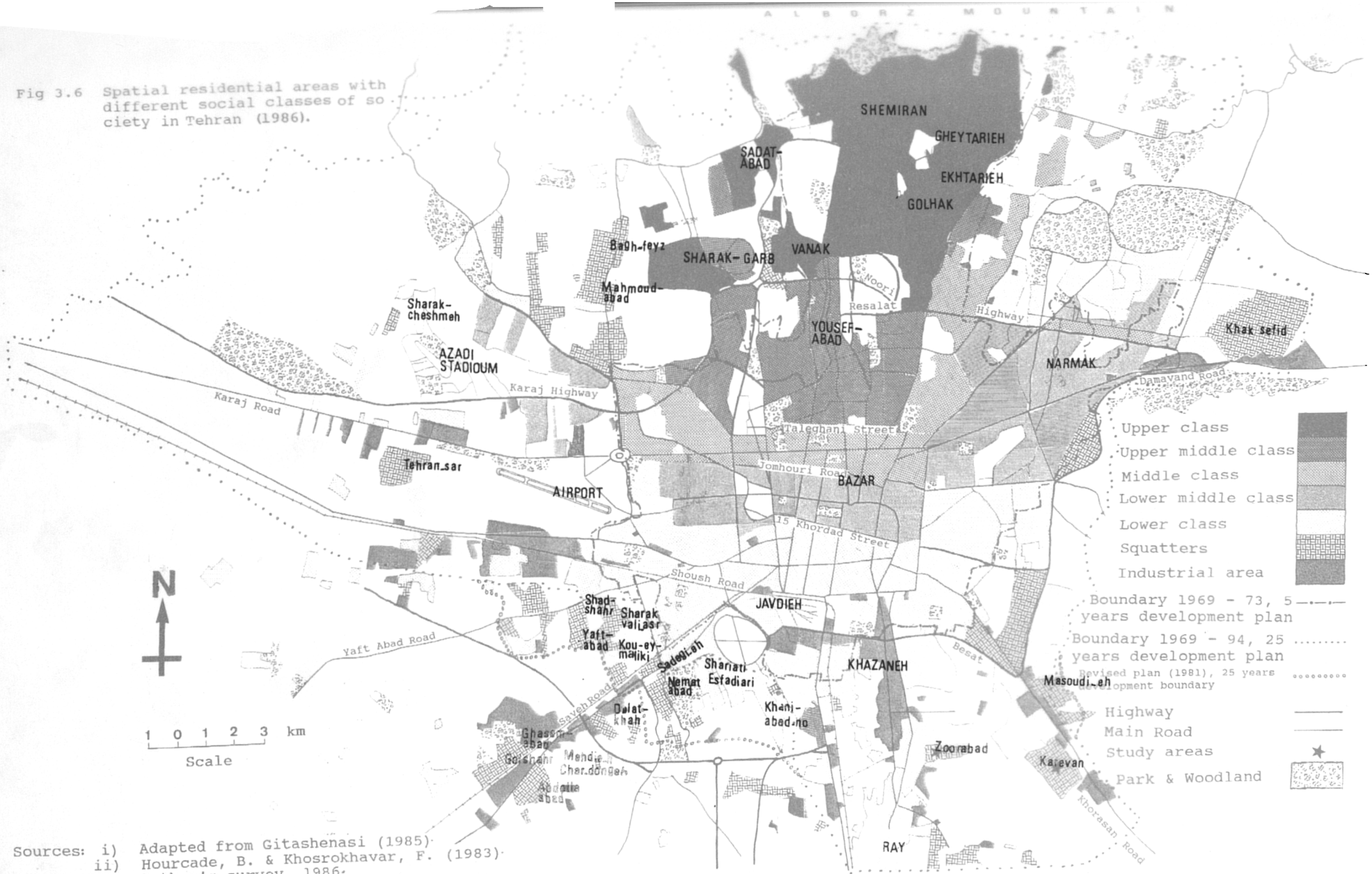
Khani-
abad-no
Zoorabad
Karevan
RAY

Fig 3.6 Spatial residential areas with different social classes of society in Tehran (1986).



Sources: i) Adapted from Gitashenasi (1985).
ii) Hourcade, B. & Khosrokhavar, F. (1983).
iii) Author's survey, 1986.

Fig 3.6 Spatial residential areas with different social classes of society in Tehran (1986).



Sources: i) Adapted from Gitashenasi (1985)
ii) Hourcade, B. & Khosrokhavar, F. (1983)
iii) Author's survey, 1986.

comprehensive evaluation of management efficiency because they reflect only current performance and ignore future performance. At the same time, the management team are involved in operational decisions at all levels such as the research and development, marketing and advertising, and many other activities. The present study cannot incorporate the financial information relating to these activities as the measures were only disclosed by a limited number of firms included in the sample. Therefore, the present study will concentrate on examining the following hypotheses:

H_0 There is no difference in profitability between the acquired and the non-acquired firms.

H_1 The profitability of acquired firms is less than the profitability of non- acquired firms.

6.2.2 The Undervaluation Hypothesis

As mentioned in Chapter Four the undervaluation theory of merger is another form of managerial inefficiency. It indicates that when a company underutilises its assets or when its management does not operate at maximum efficiency, its stock will be undervalued by the market. Tobin (1969) suggested that the undervaluation can be measured by what he called the q

ratio, which is equal to the market value of the share over the replacement cost of assets per share. Generally, the lower a firm's q ratio the greater its vulnerability as a merger target. A low valuation ratio is an indication for the acquirer that it is more economical to expand the business by purchasing the undervalued firm than expanding using internal investment. As the replacement value figures are not available for the sample, two possible surrogates can be used. Replacement costs can be estimated from the publicly available accounting information. Replacement values can be calculated by estimating the replacement value for assets and liabilities for each individual firm, which will be costly. If the researchers relies on published estimates by firms, difficulties might arise as this information will not be available for all firms and there are also likely to be problems arising from the diverse methodologies used by different firms. The alternative is to apply aggregate indexes which will guarantee consistency in methodology across all the firms, but this can be highly unreliable, as it imposes high levels of homogeneity across firms as regards the plant and equipment held and the extent of maintenance and upgrading. The use of aggregate indexes does not consider the accounting methods used by each individual firm and the differential ability of these firms to reflect technological changes. As the study is concerned with valuing the status of each company for possible

acquisition, the aggregate indexes will be misleading. To avoid the difficulties of the estimation of replacement cost for each company, and because some empirical evidence has indicated the existence of high correlation between the historic and replacement costs (Williamson 1981), the book value is believed to serve the present purpose satisfactorily. Therefore, the study will examine the following hypotheses:

H_0 There is no difference in the valuation ratio between the acquired and the non- acquired firms.

H_1 The valuation ratio of acquired firms is lower the the valuation ratio for the non-acquired firms.

6.2.3 Price-earning Ratio

This hypothesis indicates the existence of an instantaneous gain accruing to the acquirer when a company with a low P/E ratio is acquired. Hence the lower the P/E ratio the higher the probability of a firm becoming a take-over target.

H_0 There is no difference in the P/E ratio between the acquired and the non-acquired firms.

H_1 P/E ratio for the acquired firms is lower than the P/E ratio for the non-acquired firms.

6.2.4 Financial Synergy Hypothesis

Stapleton (1982) demonstrated that financial synergy, in terms of debt capacity, can be achieved by mergers. Lewellen (1971) suggested that mergers can prevent bankruptcy. Although it is difficult to establish a clear attribute to be used as a surrogate in the differential classification model related to this hypothesis, some finance-related attributes have been identified in the empirical literature and will be examined in this study to assess their reliability. Mead (1969) hypothesised that a firm becomes an attractive merger candidate if its capital structure provides the acquiring firm with latent debt capacity. Therefore, measures of financial leverage are used to indicate this effect.

Another synergistic financial motive is achieved when a firm acquires a cash-rich firm to improve its own liquidity and to fund investments in the acquiring firm's existing businesses. However, if the capital market is efficient the validity of this argument is questionable, because there would be little value in acquiring cash-rich companies to fund investment in the buyer's existing businesses, as the capital could be raised by going directly to the capital markets. Liquidity ratios were calculated in most of the earlier studies, but there was no significant difference between targets and control groups.

Only Kuehn (1975) found that targets tended to have a lower level of liquidity. Therefore, the current study will examine this ratio and compare the results with previous studies. The first set of hypotheses to be tested are:

H_0 There is no difference in gearing between the acquired and the non acquired firms.

H_1 The gearing of acquired firms is less than the gearing of the non- acquired firms.

The second set of hypotheses are:

H_0 There is no difference in liquidity between the acquired and the non acquired firms.

H_1 The Liquidity of acquired firms is higher than the liquidity of the non- acquired firms.

6.2.5 Growth Resources Imbalance Hypothesis

As mentioned in Chapter Four this hypothesis refers to the existence of a mis-match between the resources and the investment opportunities available to a firm. It states that firms with a growth-resources imbalance are likely to be acquisition targets. This could involve two different situations:

(1) A firm which has excess cash and lacks profitable investment opportunities is likely to be an attractive acquisition target.

(2) A firm which suffers from constraints of capital to invest in profitable projects, will look for cash-rich firms to pursue potential investment opportunities.

As a direct measure of capital constraint is not available, the level of liquidity and gearing will be used as a surrogate measures instead. If the firm's liquidity is poor and its leverage is high this indicates low resource availability, whereas the opposite combination indicates high resource availability.

In testing this hypothesis, a combination of the growth rate, the gearing ratio and the liquidity ratio will be used. Following Palepu (1986) a growth resource dummy variable will be defined on the basis of the three variables; growth, liquidity and leverage. The dummy variable is assigned a value 1 if the firm has a combination of either low growth, high liquidity, and low leverage, or high growth, low liquidity and high leverage. The dummy is set at 0 for all other combinations. Each of the three variables, growth, liquidity and leverage is defined as high if its value for a firm is larger than that of the average for all the firms in the same sector, otherwise it is defined as low[1].

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(1) Industrial sectors analysed are those provided by DATASTREAM

6.2.6 Size Hypothesis

It has been indicated in Chapter Four that a firm's size is one of several important criterion to be considered by the acquiring firm when they implement their acquisition plan. If the size element is considered alone it might prove unimportant, however, when considered together with the other hypothesised motives for merger it might be effective in differentiating between target and non-target firms. Several empirical studies including; Singh (1971), Kuehn (1975), and Palepu (1986) have examined this hypothesis. According to this hypothesis the smaller the firm the higher the probability of it being an acquisition target. Various studies have utilised different measures to indicate a firm's size. They include book value of net assets (Singh 1971), market value of common equity (Dietrich and Sorensen 1984) and sales values (Simkowitz and Monroe 1971). However, there is no consensus on which measure provides the most accurate indication thereof. Hence this study will use all those variables in the statistical analysis. The hypotheses to be tested are:

H_0 There is no difference in size between the acquired firms and the non-acquired firms.

H_1 The size of acquired firms is less than size of the non-acquired firms.

6.3 RESEARCH DESIGN

The research design process involves several elements, i.e. research objectives, sampling procedures, data collection approaches, and data analysis (Bryman, 1989). To achieve the research objectives the researcher should carefully consider the above elements as they are important aspects in the decision process which must be taken into account when defining the research implementation process. The following sections will provide a detailed discussion of these elements.

6.3.1 Types of Research Design

Two basic purposes of the research design have been identified by Kerlinger (1964): (1) to control for variations and (2) to provide answers to the questions being researched. The objective or aim of a study determines the type of design that the researcher should use. Research in general can be exploratory in nature, descriptive, analytical and/or predictive. The nature of the research will largely depend on how far research in the area in question has been developed and on the objectives of the research itself. The method of research becomes more challenging as one proceeds from the exploratory stage where the objective is to explore new areas of research,

through the descriptive stage where the aim is to describe certain characteristics of the phenomenon under investigation and finally on to the analytical or predictive stage where the objective is to examine whether the hypothesised relationships have been substantiated and whether an answer to the research question has been obtained (Emory, 1985).

An exploratory design is implemented when the researcher is seeking to acquire new information, new insight into a phenomenon about which she/he has very limited knowledge, or where she/he has inadequate knowledge of how similar research problems or research issues have been tackled in the past. In this context, it is important to note that an exploratory study is defined as being conducted in a particular area or topic where only few prior studies have been completed and knowledge in the particular field is scant (Denzin, 1970).

A descriptive study, however, is mainly concerned with identifying an accurate profile of persons, events, or objects. In a descriptive study the investigator focuses on events that are in process or which have already taken place. Unlike exploratory studies they require extensive previous knowledge of the problem to be researched or described.

Finally, studies can also be either analytical or predictive in nature (Emory, 1985). Analytical research would be undertaken when the problem definition goes beyond describing the variables in a situation to knowing why or how certain factors are associated with, or contribute to a specific phenomenon. In this case, the researcher advances beyond merely trying to understand what is happening to analysing why and how a phenomenon is occurring.

Predictive research, on the other hand, is implemented for the purpose of analysing not only "whether, how, or why" an event is occurring in a particular situation, but also "whether, how, or why" an event could occur in several other situations. In other words, the objective of the research would be to examine to what extent one would be able to predict similar results regarding a specific event (Emory, 1985).

One should, however, acknowledge the fact that a single research project may encompass all three types together, i.e.; exploratory, descriptive, and analytical and/or predictive. These research types will evolve at different stages of the research process as the study progresses to its conclusion, and in some cases there will be no definite cut off point between the various research types. This indicates that the stages of advancement of knowledge in the research area and the nature of the

research objectives dictate the type of study to be implemented.

In this study, and considering the research objectives outlined earlier, it is appropriate to say that for the purpose of satisfying the first research objective, i.e., "To identify the financial characteristics of firms acquired during the period 1980-1986" the research can be seen as descriptive. Furthermore, when considering the second research objective i.e., " Does this profile of financial characteristics of the observed firms provide a useful criterion for identifying those firms with a high probability of subsequently being acquired?", the current study can be considered as predictive because not only does it present what were the characteristics of acquired firms, but it also helps to find out the extent to which one would be able to predict future acquisition targets.

Finally, in addressing the research objectives, a literature review of merger activity has been undertaken and the findings of previous research have been analysed, thus incorporating descriptive and analytical approach.

6.3.2 Time Horizon

A study can be conducted in which data are gathered just once, perhaps covering a period of days or weeks or years in order to answer a research question. This type of research is called cross-sectional research (Adams and Schvaneveldt, 1985). In other cases, the researcher might want to investigate a phenomenon at several points in time in order to study its changing patterns. Here, such research is called a trend or longitudinal study.

As indicated earlier, the purpose of this research is first to investigate the differences between the characteristics of firms acquired and not acquired over the period 1980-1986. This is a cross-sectional analysis.

6.3.3 Sample Design

One of the important decisions in research design pertains to sampling (sample design). Sample design relates to the size of the sample necessary to generalise the findings from the sample data to the whole population. It is the goal of quality research to have a sample that is truly representative of the total population from which the sample has been selected (Adams and Schvaneveldt, 1985).

Sampling is the process of selecting a sufficiently large number of items from the population, (the entire group of people or companies that the researcher wishes to investigate) so that by studying the sample and understanding the features or characteristics of the sample subjects, one will be able to generalise the features and the characteristics to the whole population.

As to the purpose of this research, and because of the nature of the research objectives, i.e. "the characteristics of acquired and the non-acquired U.K. firms during the period 1980-1986" it was necessary to collect information about all the firms acquired during the period 1980-1986. The researcher has found it important to scan these firms to fulfil the following requirements:

- They were merged in 1980-1986.
- They are from the manufacturing and retail industries.
- They are listed on the London Stock Exchange.
- They have their accounts available on DATASTREAM.

The time frame of the study, 1980-1986 was selected for two reasons. Firstly, it allows the study to be as current as possible. Second, the complexity and dynamic nature of merger activity in the 1980's and the availability of different strategies and tactics to fight unwanted take-overs or mergers has led to the belief that the acquired firms' profiles have changed from those of earlier periods.

The sample companies were selected from the manufacturing and retail industries. The sample excluded the finance sector as the financial information produced by the companies in this sector are not comparable with those produced by companies in the manufacturing and retail sectors. For example, information related to items in the balance sheet and income statement. In addition, owing to differences in the activities of firms operating in the financial sector, the structure of their income statements are incomparable with those in the manufacturing and retail sectors (e.g. financial firms are usually highly geared). Hence, the inclusion of the financial characteristics of financial firms would affect the figures obtained for many of the ratios that are used in this study.

The requirement that a company be publicly quoted i.e. registered on the London Stock Exchange is due to the nature of the study. In this study the financial information provided by the company is used as an input to the linear discriminant function. The general unreliability of the financial information provided by small companies (see Storey, Keasey, Weston & Wynarczyk, 1987), and the limited information that they are required to publicly disclose, make the use of financial ratios for such companies for the purpose of classificatory model building both limited and unreliable.

The use of DATASTREAM as the main source of financial data is to limit the effect of different accounting practices applied by different firms. DATASTREAM tries as far as possible to present the accounts in a standardised format. Furthermore, using DATASTREAM made it possible to obtain information for the relevant period, especially for the acquired companies.

The sample size must be related to the nature of the research and the type of data required. However, instead of merely a random sample, the researcher should always try to secure the selection of a representative sample from the whole population (Bryman 1989). A representative sample is therefore a prerequisite, because if it is biased in any way, so that, for example, it does not cover an important unit of the population, or if each unit is not sampled in proportion to its related size, the picture of the phenomenon under investigation will be misleading. For the purpose of this study two different populations are identified; the acquired firms population and the non-acquired firms population. Because the first population is very small relative to the second population i.e. the number of firms acquired relative to the number of firms that are not acquired, and bearing in mind the nature of the research objectives, the researcher found it necessary to include all the acquired firms for the sake of accuracy.

The list of acquired firms was prepared from three sources; "The Investors Chronicle", The "Financial Times Report on Mergers and Acquisitions" and the "Acquisitions Monthly".

Reference was made to the London Stock Exchange Official Year Book for the period 1979-1987 to obtain information on the year of acquisition, the acquirer's identity (to ensure that it was a U.K. registered Company, to ensure that over 50 per cent of the company's assets were acquired, and that the Common equity for the two samples were/are registered on the London Stock Exchange).

A total of 510 targets were initially identified, of which only 118 firms have complete information about them available on the DATASTREAM data base. Therefore, it is these firms which have formed the sample for the current study. Appendix 1 presents the list of the acquired firms along with information related to the year of acquisition, and the Stock Exchange Industry Classification (SEC).

A total of 239 non-acquired firms which existed and continued to exist between the period 1979-1987 were selected randomly from all manufacturing and retail firms available on the DATASTREAM data base. No matching by size, or financial year of samples was attempted as the multivariate discriminant analysis requires random

selection of the sample. With regard to matching by industry, the argument has been developed that the influence of industrial sectors on the financial profile of companies is not clearly defined, and furthermore the activities of many firms are often spread over more than one sector. Therefore, allocation to sectors is often very arbitrary and inaccurate. However, in this study the non-acquired and the acquired firms' industry was matched to the greatest extent possible following Rege (1983). Regarding the size aspect, it has been found that this variable could itself be significant (Kuehn 1975), since smaller firms are more likely to be acquisition targets. Moreover, financial ratios have been introduced to permit the comparison of firms of different sizes and these have been found to be uncorrelated with size (Foster,1986). Regarding the problem of pairing according to financial year end, no attempt was made to do this because, although economic conditions vary over time, it can be assumed that they were reasonably consistent over the time period examined and influenced all companies in the same way.

6.3.4 Selection of Variables

Variables were selected as inputs to the linear discriminant analysis based on one of two reasons. Firstly, variables were included if there exists a sound

theoretical basis for their inclusion (i.e. those variables which serve as surrogate measures for the above mentioned hypotheses of merger motives recognised in the literature). Secondly, the inclusion of variables was based on the fact the they have been cited in earlier studies and found to be important. Stevens (1973), for example, found that four variables representing liquidity, profitability, leverage, and activity enter the final Linear Discriminant function (LDF). Firth (1976) concluded that the important discriminants include valuation ratio (share price/net assets per share), growth in profitability, and price-earning ratio.

6.3.5 Data Collection

Data can be collected from various sources and in many different ways. Data could be gathered through field surveys where phenomena occur (usually by interview, or postal questionnaire), through case study adopting in-depth and comprehensive analysis for a limited number of subjects, through laboratory experimental settings where variables are controlled and manipulated, and they can also be obtained from secondary sources such as company records and business references (Emory 1985).

The choice of data collection method depends on the nature of the research, and more importantly, the purpose of the research. Other factors which might influence data collection methodology include; the facilities available to the researcher, the degree of accuracy required, the expertise of the researcher, the time span of the study, and the costs and resources associated with and available for data gathering. In addition each of these methods has its advantages and disadvantages, and the researcher should weigh the advantages against the disadvantages as they apply to the research in question to arrive at the best possible technique for obtaining the information required.

Bearing in mind the research objectives mentioned earlier, the information required for this study involved consulting the main records issued by the company (the Annual Report and Accounts), therefore, the historical survey of company reports emerged as the most productive means of investigating the issues raised by the research objectives.

As mentioned earlier, the DATASTREAM on line data base was the main source of data collection. The main reason was related to the issue of the similarity in disclosure of information on the company's activities represented in the income statement for the sample companies. Two programmes available on DATASTREAM have

been used. The first was used to obtain information on the financial ratios for each company and for each sector, the second one was used to get information about the market value and the P/E ratio. Appendix 2 presents the computer output for these programmes.

A list of the variables employed in this study is shown below. It contains those variables found to be important in previous studies. The list also includes important variables which have not been used previously in studies investigating merger candidates. Therefore, all variables are derived from either the theoretical or the empirical literature as potentially important discriminators in developing a model to classify merger candidates. Appendix 3 provides a description of the way these variables have been calculated and provided by DATASTREAM.

Profitability Measures

- Return on capital employed
- Return on shareholders equity
- Profit margin ratio
- Cash flow margin
- Earnings margin
- Turnover ratio

Leverage

- Capital gearing ratio
- Borrowing ratio

Liquidity

- Working capital ratio
- Quick Assets ratio

Growth
- percentage change in sales

Size
- Book value of net assets
- Market value of common equity
- Sales

Asset Undervaluation
- Market value of common equity /Book value of common equity

price- Earning ratio
- Price per share / earning per share

Funds Flow measures
- Funds generated from operations/sales
- Funds generated from operation /Market value
- Funds generated from operation/Book value
- Total sources/sales
- Total sources/Market value
- Total sources/Book value
- Movement in liquid Funds/sales
- Movement in liquid Funds/Market value
- Movement in liquid funds/Book value

The financial variables for the two samples were calculated from the most recent data available. Also, to investigate whether the trend in financial ratios is a better indicator of a company being an acquisition target, it was decided to use averages for 2,3,4 and 5 years. Appendix 4 presents the programme used to calculate these averages using the SPSS statistical package. Average data were calculated as $X_t = \frac{\sum_{i=1}^{n} X_{t-1}}{n}$

where

X_t is the average value at years t before acquisition
n is the number of years.

The funds flow measures have been used to test the usefulness of this information in acquisition prediction. Recent research studies have been conducted to test the use of funds flow information in predicting corporate failure. Gentry, Newbold and Whitford (1987) used cash based fund flow components to classify failed and non-failed firms and they concluded that cash based fund flow components and financial ratios provide significant information for the classification of failed and non-failed firms.

6.4 DATA ANALYSIS

The statistical techniques available for data analysis are discussed in the following section. However, in order to carry out the statistical analysis of the data it was necessary to prepare the data for this procedure. This has involved the process of cleaning the raw data obtained from DATASTREAM. This task has been accomplished using a programme written in Pascal Language (see Appendix 5). This programme was mainly used to clean the data output files obtained from DATASTREAM (i.e. to delete the words after the code for each item of financial information presented in appendix 2). Further manual work was needed to clean the output files in order to arrange the financial information in specific rows and columns to be able to write the command file presented in Appendix 6.

Two statistical packages; SPSS, and SAS were used to carry out the different types of statistical analysis. A number of command files within each statistical programme were prepared in order to carry out the statistical analysis required for the study. Appendix 6 presents an example of these command files. This appendix presents the main programme used to arrange the data in rows and columns to be read by the statistical packages (SPSS and SAS) and also gives an example of a command file which was written to carry out the Multivariate Discriminant Analysis procedure (MDA).

The following is a summary of the steps involved in the data collection and analysis procedures.

- The first step involves the down loading of data for the variables listed earlier for the two samples (the acquired and the non-acquired groups). This has been done by calling Datastream on-line service, which provided the researcher with a list of codes allocated to the companies used in the sample. Codes are allocated for each individual item of financial statement and balance sheet information and financial ratios. On keying the appropriate code, the financial information is displayed. An example is provided in the following table. However only five companies can appear on screen at any one time. The data collection therefore involved the process of re-writing the list of

information required to obtain the output for each group of companies.

Table (6.1)

911933*

Gelfer, A & J.

		31/3/81	31/3/82	31/3/83	31/3/84	31/3/85
701**	RETURN ON S'HOLDERS EQUITY	13.07	11.86	12.18	12.61	13.36
707	RETURN ON CAPITAL EMPLOYED	26.80	24.73	25.42	25.01	24.43

* A company code allocated by Datastream
** Financial variables' code

- The second step in the data collection was to prepare the data for analysis. This involved the use of a Pascal programme as shown in appendix 5. This was written to delete the headings and words that appeared in the above output sample. After cleaning the data in this way, further manual work was required to arrange the numbers into equal cells (i.e having the same variable for each company in the same column interval).

- the third step involved the preparation of system files which were required to transfer the raw data files into ASCII files so that they could be read by SPSS(PC) and SAS statistical package (see Appendix 6). The SAS statistical package was used because the stepwise logistic procedure was not available on the SPSS at the time of the analysis was carried out.

- The fourth step involved the writing of a number of different command files. These included those required to calculate variables other than those produced by Datastream e.g the market value over the book value of each firm and the 2,3,4 and five year average data and other command files required to carry out the univariate and the multivariate analysis (see Appendix 4). For the SPSS statistical package, the command files were written on separate files other than the data files but for the SAS statistical package the command files are required to be at the top of the data files.

6.4.1 STATISTICAL METHODOLOGY

Both Multivariate Discriminant Analysis (MDA) and stepwise logit analysis were conducted for each year and for each set of variables. *The researcher chose to do this for* three reasons: Firstly, most of the previous research on merger and acquisition classification has used MDA. A more appropriate comparison of the results of the financial characteristics of firms involved in acquisition in the 1960s and 1970s with that of the 1980s (the time period covered by this study) can be accomplished when the same statistical method is applied. Secondly, the violation of the MDA assumptions which are described in the following section has led to the belief that, although some

studies have shown MDA to be robust to violation of the multivariate normality assumption and the unequal of dispersion matrices assumption, the use of logit analysis as an alternative method is stimulated because of its frequently cited conceptual advantages relative to multiple discriminant analysis. These issues are elaborated upon in the following sections. Lastly, given these possible problems with MDA, the use of two techniques allows a comparison to be made to determine whether the conclusions of discriminant analysis are confirmed by another technique. Sheth (1979) indicated that in order to avoid the danger of making inferences about realities which may be an artefact solely due to peculiarities of just one multivariate method, the same data should be subjected to at least two multivariate techniques.

6.4.1.1 Multivariate Discriminant Analysis

Discriminant analysis has been utilised in a variety of disciplines. Since its first application by Fisher (1936), the use of discriminant analysis has gained a wide acceptance in applied business research. Pinches (1978) provides an exhaustive bibliography of articles dealing with empirical and theoretical applications of this procedure. Multivariate Discriminant Analysis (hereafter MDA) is superior to univariate approaches because it allows

for the examination of a profile of variables rather than one variable at a time. MDA, therefore, takes into account variables' interaction. Discriminant analysis is particularly well suited to this study because the problem involves the classification of companies into one of two groups (acquired and non-acquired) on the basis of a set of firm's characteristics. Additionally, the use of MDA involves less restrictive assumptions regarding independent variables than other techniques such as regression analysis. For example, the classical regression model assumes that independent variables are uncorrelated amongst themselves. Violation of this assumption is known as multicollinearity. Since financial and non-financial characteristics are likely to be highly correlated, MDA is more appropriate for this research than regression analysis. Eisenbeis and Avery (1972) points out that multicollinearity is generally not a statistical problem in discriminant analysis. In fact, multicollinearity is a sample property that is largely an irrelevant concern in multivariate discriminant analysis except where the correlations are such that it is no longer possible to invert the dispersions matrices. Altman and Eisenbeis (1978) add:

> "In regression analysis multicollinearity affects the standard deviations of the coefficients, and hence biases the test of significance for the coefficients, it does not affect the estimates of the coefficients themselves, which are still unbiased. In

> discriminant analysis, the standard deviations of the coefficients, are usually not calculated, nor are there applicable tests for the significance of the individual coefficients....the only time that multicollinearity is of concern in discriminant analysis is if it is severe enough so as to preclude inversion of a dispersion matrix used in calculating the coefficient". p 188

The primary purpose of MDA is to classify objects correctly into mutually exclusive groups. This classification is accomplished by the decision rule of maximising the ratio of between groups to within-groups variance covariance for the input set of independent variables. MDA for classification into a priori categories yields a Multivariate Discriminant Function (MDF) of the form;

$$Z = b_j X_i + b_2 X_2 + \ldots\ldots + b_m X_m$$

Where

X_i= the ith attribute of independent variable (j= 1,2,.m)

b_j= the discriminant function coefficient for the ith attribute.

Z= The discriminant score.

The Discriminant Function maps points representing entities into different groups from an m-dimensional attribute space into a one dimensional space in such a way that the distribution of points from the two groups are mutually separated.

SHAHRAKE DOLATABAD
ZOORABAD
FADAIEYAN ISLAM ROAD

FIG 4.2.1 AERIAL PHOTOGRAPH OF ZOORABAD, 1979.

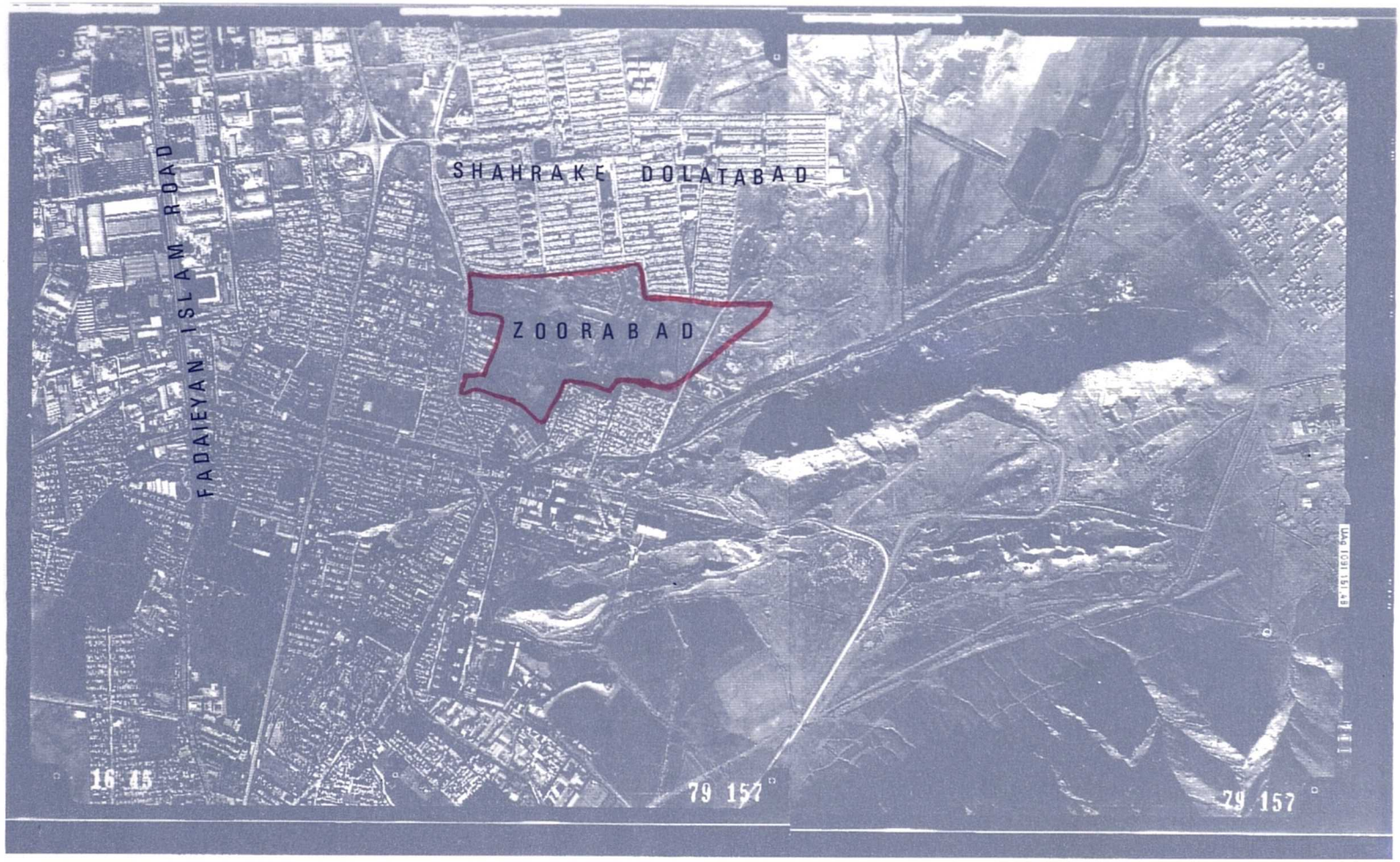


FIG 4.2.1 AERIAL PHOTOGRAPH OF ZOORABAD, 1979.

KHORASAN ROAD
KAREVAN
MOSHIRIEH
CEMENT FACTORY

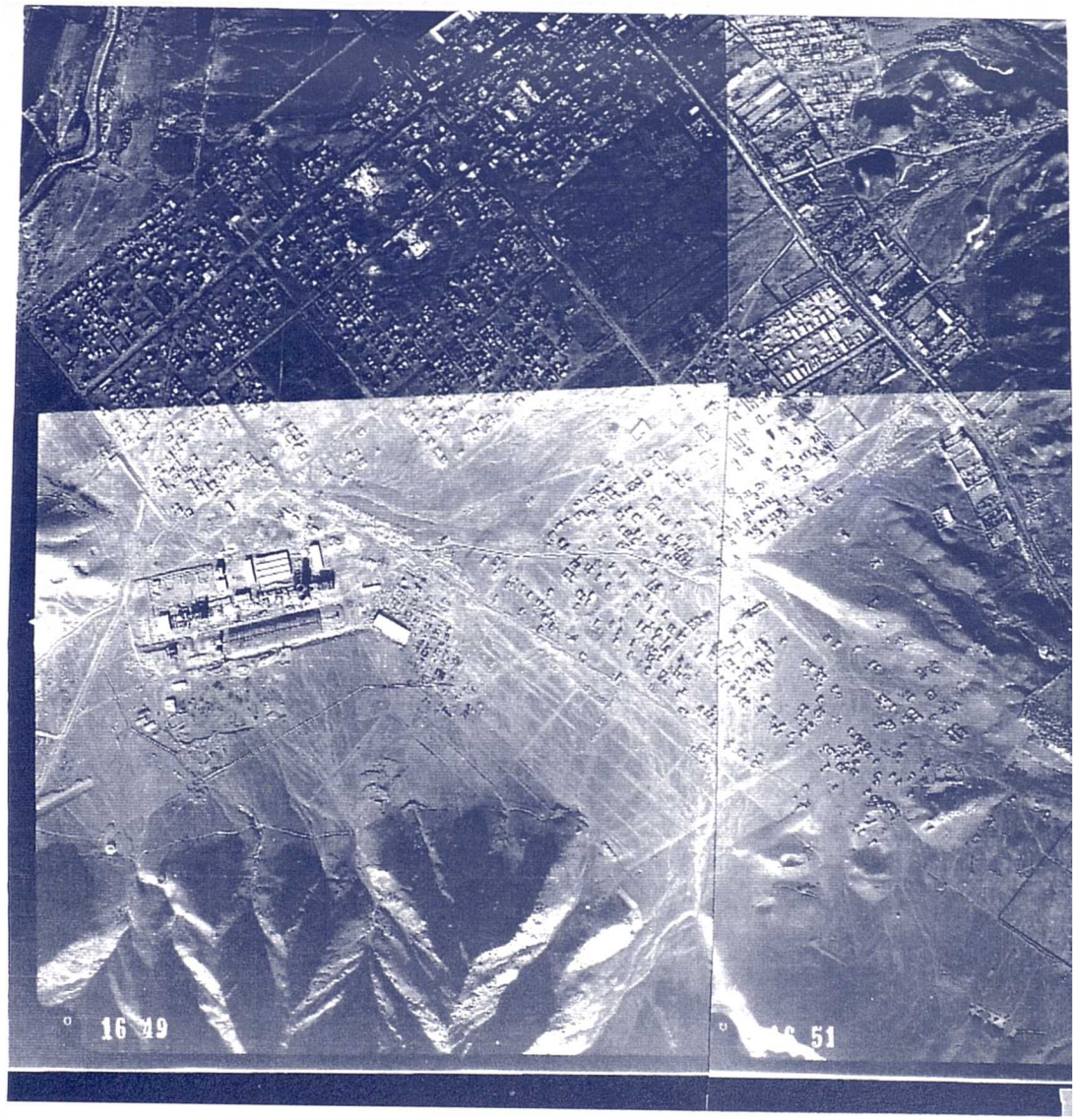


FIG 4.2.2 AERIAL PHOTOGRAPH OF KAREVAN IN 1979.

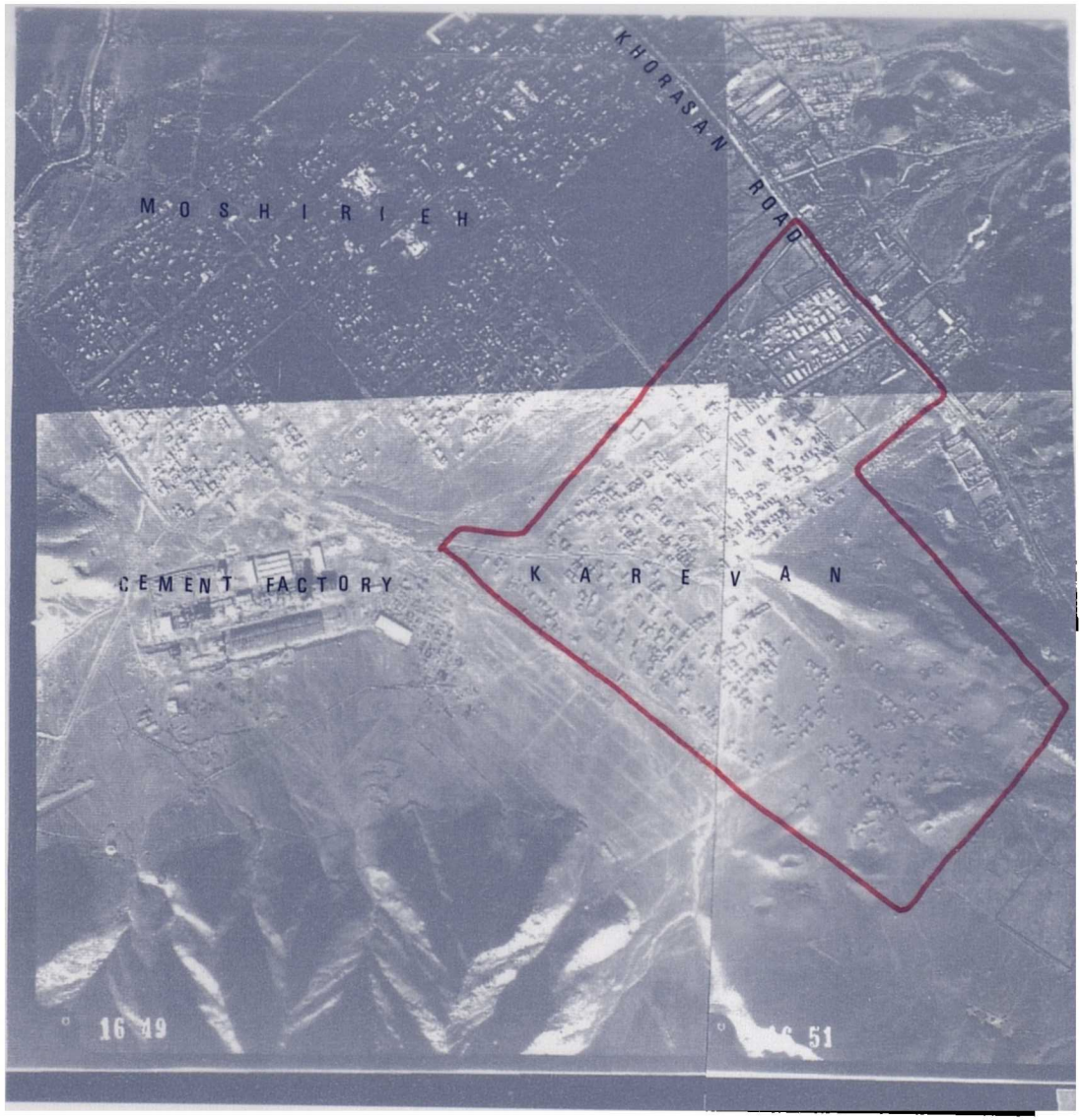


FIG 4.2.2 AERIAL PHOTOGRAPH OF KAREVAN IN 1979.

Eisenbeis (1977) agrees that unequal dispersion implies that a quadratic rule should be used. Pinches (1978), however, advocates the use of a quadratic rule only in cases where the test for equality of the dispersion matrices conclusively indicates evidence of heterogeneity in the population. Testing for unequal dispersion matrices in the presence (or likely presence) of non-multivariate normality yields biased results.

Michaelis (1973) shows that quadratic rules are more sensitive to small sample sizes. Marks and Dunn (1974) agree that with multivariate normality, the quadratic rule does not perform as well as the linear rule for small sample sizes.

The assumption of an identical dispersion matrix, while important to the significance testing phase of discriminant analysis, is not critical to classification since quadratic methods are available when it is not met (Richardson and Davidson, 1984). Hence, the test for this assumption is not necessary for the purpose of this study.

6.4.1.2 LOGIT ANALYSIS

The technique of logit analysis has recently been used in business research as an alternative to discriminant

analysis. Ohlson (1980) suggests the logistic regression as an alternative to Multivariate Discriminant Analysis (MDA), and he reported accurate predictions of bankruptcy with the method.

In the logit model, in contrast to MDA, the probability (PR) of a firm being in a particular state i is:

$$PR_i = 1/1+ e^{-W}$$

In this equation, e is equal to the natural logarithm. The combination of coefficients and ratios determine the probability of a firm being classified into one state or another, but in a non-linear manner.

In comparison to MDA, there are a number of advantages to the use of logit when analysing a dichotomous dependent variable. The major advantage of logistic regression is that the method does not require distributional assumptions about the independent variables.

Another stated advantage of the logit model is that the model does not give an ambiguous classification of merged and non-merged groups of firms. While this

advantage is frequently cited as a significant one, MDA also allows the probability of an event to be computed via a Bayesian adjustment. However, if the assumptions of multivariate normality and equal dispersion matrices have been violated, MDA probability estimates are biased (Zavgren, 1983).

6.5 SUMMARY AND CONCLUSIONS

This chapter has stated the main objectives of the research. It has also explained the research hypotheses.

A discussion of the research design has been provided, whereby the types of research design, time horizon, sample design, and data collection procedures have been discussed. The argument was also developed to allow the researcher to arrive at the most convenient and appropriate research methodology to be used to satisfy the stated objectives.

Data analysis procedures have been highlighted, whereby a recommendation for the application of two statistical techniques has been presented. The Multivariate Discriminant Analysis (MDA) and logit analysis. The reasons for applying the two techniques were firstly to be able to assess the validity of the criticism

regarding the violation of the assumptions for the (MDA) technique and their effects on the classification bias. Secondly, recent research studies of bankruptcy prediction models and in particular of merger classification have used the logit technique. For the purposes of comparability, it was found to be necessary to adopt this technique for the current study.

CHAPTER SEVEN

COMPARISON OF THE CHARACTERISTICS OF ACQUIRED AND NON-ACQUIRED FIRMS: UNIVARIATE ANALYSIS

7.0 INTRODUCTION

This chapter presents a general picture of the extent of the differences or similarities between the characteristics of the two groups of firms. Univariate results are discussed for the 27 ratios originally selected as surrogate measures for the hypotheses found to be important in determining mergers between firms.

In comparing the economic and financial characteristics of acquired and non-acquired firms, both the short and long-term records of the firms have been used. Unlike most of the previous studies which used only one-year or the average of three or five-year data, in this study records for the current year and for averages of the previous 2,3,4, and five years were obtained for the 27 variables that represent measurements of the six main hypotheses discussed in Chapters Four and Six . Using more than one years' records, it is hoped to shed light on the changes that occur for the calculated ratios and to provide information on how many years of data is likely to provide

the most efficient classification function.

This chapter therefore provides a cross-sectional comparison of acquired and non acquired firms in terms of 27 variables over various time periods.

Providing such a univariate analysis helps future researchers in comparing the results of similar studies, and might be of interest to practitioners seeking to determine take-over targets' characteristics.

However, before presenting the univariate results for this study, the following section provides a literature review on financial ratio analysis, especially studies related to the distributional characteristics of financial ratios, and its implications for the different statistical techniques which will be used in this study.

7.1 STUDIES OF FINANCIAL RATIOS DISTRIBUTION

Financial ratios are used for many purposes. These include assessment of the ability of the firm to pay its debts, appraising the performance of managers, bond rating, and security analysis. Whittington (1980) indicated the existence of two major fields where ratios have been used. The traditional, normative, use of financial ratios, in

which the ratios of a firm are compared with a standard, for example, the use of industry averages as norms for financial ratios (Lev 1969). An alternative use of ratios is the estimation of a functional relationship for the purposes of prediction. This positive use of financial ratios has been developed by those interested in predicting the future profits of a firm. By estimating future sales and multiplying these by a profit margin ratio, profits for future periods can be estimated. Financial analysts are interested in using financial ratios to predict events of interest, such as bond rating changes, bankruptcy and mergers. The positive use of financial ratios depends on the nature of the distribution of the input data. As a result, some research studies concerned with the statistical distribution of ratios have emerged in the accounting discipline. Most of the research has been done in the US. However, two major studies which have been carried out using U.K. data will be discussed later in this chapter.

Horrigan (1965) examined the statistical distributions of seventeen ratios for 80 companies in the U.S.A for the period 1948-1957. He concluded that most ratios approximated normality but there was some evidence of positive skewness[1].

(1) A skewed distribution departs from the bell-shaped curve of the normal distribution in either upper-lower peaks of the distribution. If the actual distribution has a long tail pointing to the right, the skewness is positive, a long tail pointing to the left, the skewness is said to be negative.

Deakin (1976), however, provides evidence that suggests that Horrigan's results do not hold for all companies or across different time periods. He investigated the distribution of eleven financial ratios over the period 1955 to 1973 for all manufacturing firms available on the Compustat 1800 Company File, and examined whether square root and logarithmic transformations would help ratios approximate normality. He concluded that the null hypothesis of normality was rejected except for the total debt/total assets ratio. Although a better approximation to normality was obtained by applying square root or logarithmic transformations to the raw data, Deakin observed that many financial ratios still deviate significantly from the normal distributions after such transformations have been applied.

Bird and McHugh (1977) studied the distribution of five ratios for 118 firms in Australia over the period 1967-71. They concluded that financial leverage and efficiency ratios were generally normally distributed, Quick assets and working capital ratios were not normally distributed, with no conclusive results in the case of the profitability ratios.

Ricketts, and Stover (1978) analysed 11 financial ratios for US banks over the 1967-1974 period. The conclusion was that "a normality assumption could not be

rejected for most of the commercial banks examined" p(123).

Bougen and Drury (1980), examined the distribution of seven financial ratios for over 700, U.K. companies in 1975. The ratios used were representative of Pinches et al.'s (1973) hierarchial classification. The ratios analysed were; return on investment, capital profit margin, borrowing to shareholders' funds, current ratio, acid test ratio, inventory turnover, and debtor turnover.

They concluded that "The U.K. evidence for the distribution of *financial ratios seems to indicate non-*normality caused by varying degrees of skewness and the existence of extreme outliers" (p 46). A normal distribution was rejected both for the whole sample and at the individual industry level.

More evidence on the effect of outliers was provided by Frecka and Hopwood (1983) who analysed the same 11 financial ratios used by Deakin (1976) for the 1950-1970 period. The focus was on the effect of outliers on the distribution properties of financial ratios. Outliers were identified using both skewness and kurtosis tests. They concluded that the skewness and non-normality of financial ratios can be eliminated by deleting outliers, and hence normality or approximate normality can be achieved.

Ezzamel et al (1987) conducted a similar test on the same eleven ratios used in the Deakin study. The focus was on the effect of data transformation and outliers on the properties of the distribution of financial ratios. A sample of 2100 U.K. quoted and non-quoted companies as well as over 300 dead companies for the period 1980/81 from three industrial classifications similar to those used by Deakin (1976) were selected; textile, retail foods and metals and a mixed sample of 40 firms from other industries were also used. They suggested that non-proportionality[2] probably explains why, even after eliminating outliers, normality could still not be achieved. They also reported that transformation of the raw data by using natural logarithmic transformation had resulted in worse skewness for some ratios, while using square root transformation was more successful at improving approximation to normality.

A study by So (1987) computed the same 11 ratios used by Deakin for manufacturing firms on the Compustat tape for the period 1970-1979, and examined the impact of outliers on the non-normality of financial ratios. The conclusion was that:

---

(2) An important assumption underlying the use of ratios as a control for size differences is strict proportionality between the numerator and the dominator. Non proportionality occurs if, when regressing the numerator against the dominator, a constant or intercept term has been found, or a nonlinear relationship has been found, see Foster 1986 (P96-97).

> "outliers are one of the factors that causes the distribution of cross sectional financial ratios to be skewed and non-normally distributed. The outliers, however, are not the only source of non-normality. After removing the outliers, the distribution of many financial ratios are still non-normally distributed and asymetrically distributed. These finding imply that the basic assumption of ratio analysis ,i.e. proportionality, may indeed be violated for most ratios and violation seems to be more serious for the cash flow/total debt ratio, and the net income/total assets ratio. Since these ratios are significantly different from normality before and after the removal of outliers, the relationship between the two variable in the ratios may be either nonlinear or an intercept term exists when we regress one variable on the other variable in the ratio" (P.491).

In conclusion, most of the studies reviewed above indicated that many financial ratios are not well described by a normal distribution. The reason/reasons for this have however not been clearly or fully tested in the literature. Some of the studies reviewed above provide an explanation for the existence of non-normality. Frecka et al (1983) and Ezzamel et al (1987) indicated that the existence of the outliers might be the reason behind the non-normality. However, the non-improvement in the distribution after removing the outliers has led some authors to conclude that the existence of non proportionality, the basic assumption for ratio analysis, is the reason for non-normal distribution of financial ratios.

This notwithstanding, a direct comparison between these studies is not possible for several reasons. First, the time period covered by the studies vary. The most recent was the 1970-79 period in the So (1987) study in the US and the 1980/81 period in the Ezzamel et al (1987) U.K. study. To the extent that the statistical properties of financial ratios change over time, the observed distribution evidence of studies covering different time periods, is likely to be different. Second, different studies have used different financial ratios, except for Frecka and Hopwood (1983), Ezzamel et al (1987) and So (1987) who used the same set of ratios used by Deakin (1976). Hence as different ratios have different statistical properties, the distributional evidence of studies using different ratios is likely to be different. Even so, using the same ratios is not a safe criterion for comparison, as different researchers have used different definitions when calculating certain ratios.

In this study the distributional properties of individual ratios that were used will be reported. A comparison between the results of this study and the results from other studies will be carried out wherever possible.

7.2 DESCRIPTIVE STATISTICS AND HYPOTHESES TESTING

The following section provides the descriptive statistics for 27 ratios originally selected as proxy measures for the hypotheses discussed in Chapter Six and the results for the univariate analysis will be presented. A comparison between the results of this studies and the previous U.K. studies will be carried out wherever possible.

7.2.1 Descriptive Statistics and Univariate Analysis: The Inefficient Management Hypothesis

The following table provides the details of the distribution for the two groups, and for all the variables that were selected as proxy measures for profitability. The skewness estimates are high for all ratios and for both groups.

The table also provides information about the mean values for each ratio for the two groups. The figures in this table indicate that the mean value for the acquired groups for all profitability (except for cash flow margin ratio (CFMR) and turnover ratio (TR)) measures are less than those for the non-acquired group. However, to test the alternative hypotheses mentioned in Chapter Six namely that:

H_0 There is no difference in profitability between the acquired and the non-acquired firms.

H_1 The profitability of acquired firms is less than the profitability of non-acquired firms.

Table (7-1a)
Descriptive Statistics (Profitability measures)
One Year Before the Acquisition

Variables			Mean	Skewness	Kurtosis
Group 1 (a)		ROCER*	15.90	2.12	10.17
2 (b)			16.21	1.17	5.56
1		ROSER*	8.45	-0.36	8.37
2			10.60	0.33	32.29
1		PMR*	5.35	2.21	7.61
2			6.10	0.52	2.27
1		CFMR*	6.43	2.61	10.02
2			6.41	0.63	3.53
1		EMR*	2.66	2.08	7.72
2			3.61	-0.18	3.89
1		TR*	3.14	2.74	8.53
2			2.70	3.31	16.26
1		EPS*	8.41	2.03	5.57
2			11.86	4.80	39.03

a 1= the acquired group, b 2= the non-acquired group
* ROCER= return on capital employed ratio.
* ROSER= return on shareholders equity.
* PMR= profit margin ratio.
* CFMR= cash flow margin ratio.
* EMR= earning margin ratio.
* TR= turnover ratio.
* EPS= earnings per share.
* The details of the calculation of these ratios are provided in appendix 3.

The significance of the difference between the two means is to be emphasised. The following table provides the results for two tests, the Kolmogrov-Smirnov test (K-S) and the Mann-Whitney (M-W).

Table (7-1b)
Statistical Tests (Profitability Measures)
One Year Before Acquisition

Variables		K-S-Z	M-W
Group1(a)	ROCER	1.41*	-0.87
2(b)		1.41*	
1	ROSER	1.51*	-3.07**
2		2.83*	
1	PMR	1.64*	-2.34**
2		1.56*	
1	CFMR	1.63*	-1.08
2		1.16*	
1	EMR	1.51*	-3.42**
2		1.50*	
1	TR	2.12*	-1.21
2		2.61*	
1	EPS	1.83*	-3.18**
2		2.50*	

a 1=acquired firms group,and b 2=the non-acquired group
* significant at .05 or less
** significant at .01 or less

The Kolmogrov-Smirnov test is used to see how well the distribution for the two samples fits the normal distribution where the observed significance level is small enough to cast doubt on the assumption of normality. Using the .05 significance level, table 7-1b indicates that all

ratios were non-normally distributed. Hence the Mann-Whitney test has been applied instead of the t-test. The M-W test is a non-parametric test which is compatible to the t-test but applied when the assumption that the two samples are selected from normally distributed populations does not hold. This test assumes that the two data sets are modelled by two distributions whose density functions need not be specified. The purpose of conducting this test is to help draw conclusions about the population mean. Using an observed significance level (usually less than .05 or .01), the null hypothesis to be tested is that the two distributions are identical. The alternative hypothesis is that the two distributions differ but only as regards their mean. Indeed in univariate analysis, one is concerned with the magnitude of the difference between the two sample means (the acquired and the non-acquired samples). Where such difference is significant for certain ratios then conclusions can be drawn about the financial characteristics that can be used to differentiate between the two groups on a univariate basis.

The visual examination of the data shows that there is a marked difference between the acquired and the non-acquired firms one year before acquisition for the return on shareholders equity ratio (ROSER), profit margin ratio (PMR), earning margin ratio (EMR), and earnings per share (EPS). For these ratios, non-acquired firms are more

profitable (at the .01 significance level). However, for the rest of the profitability measures the difference between the means ranks of the two groups is not significant. Hence, using one-year data the above measures do not give support to the null hypothesis mentioned in chapter six which states that " there is no difference in profitability between the acquired and the non-acquired group". The result, indeed supports the alternative hypothesis that "the profitability of the acquired firms is less than the profitability of the non-acquired firms". As the profitability measures have been used as proxy measures for the inefficiency of the management, the above result supports the inefficient management hypothesis.

When two-year average data have been used in the analysis, the mean value for the acquired group is shown to be greater than that for the non-acquired firms when the return on capital employed (ROCER) and return on shareholders equity (ROSER) have been used to measure profitability as shown in table 7-2a. However, the results in table 7-2b indicates that such a difference is not statistically significant for (ROCER) but significant for (ROSER). The reason for this reversal in the results might be due to the fact that the management was concerned with making a profit to distribute to shareholders and to provide the return on the original investment, but they were unable to maintain the level of earnings through new

investment. Hence their bad performance has made the particular firm a take-over target.

Table (7-2a)
Descriptive Statistics (Profitability Measures)
Two Years Before Acquisition

Variables			Mean	Skewness	Kurtosis
Group	1	ROCER	16.60	3.30	16.80
	2		15.79	2.06	10.84
	1	ROSER	10.55	8.85	89.37
	2		9.29	-0.02	14.03
	1	PMR	5.24	2.09	6.73
	2		5.82	0.66	2.64
	1	CFMR	6.12	2.52	11.63
	2		6.22	.94	4.49
	1	EMR	2.51	2.21	7.24
	2		3.30	-0.07	3.91
	1	TR	3.23	2.91	9.45
	2		2.72	3.12	13.76
	1	EPS	7.67	2.00	6.28
	2		10.50	5.74	53.85

The mean values for profit margin ratio (PMR), cash flow margin ratio (CFMR), earnings margin ratio (EMR), and the earnings per share ratio (EPS) were higher for the non-acquired group. The skewness and the kurtosis were high for most ratios. The K-S test, and the M-W test results for two years before acquisition are presented in table 7-2b. The results for the K-S show that the data are not normally distributed which was as a result of the existence

of high skewness and high kurtosis. The results for the M-W test indicate that the mean difference are significant for the (ROSER), (PMR), (EMR) and (EPS). The significance level decline from .01 to .05 for (ROSER) and (PMR) when two-year average data were used, but the significance levels are the same for the (EMR) and (EPS) variables.

Table (7-2b)
Statistical Tests (Profitability Measures)
Two Years Before Acquisition

Variables		K-S Z	M-W
ROCER	1	1.92*	- .07
	2	1.93*	
ROSER	1	3.56*	- 2.24*
	2	2.52*	
PMR	1	1.96*	- 2.06*
	2	1.32*	
CFMR	1	1.75*	- 1.31
	2	1.49*	
EMR	1	1.82*	- 3.64**
	2	1.60*	
TR	1	2.21*	- 1.08
	2	2.67*	
EPS	1	1.51*	- 2.54**
	2	2.88*	

* significant at .05 level or less
** significant at .01 level or less

The same results have been achieved when three-year average data have been used. Table 7-3a presents descriptive statistics for the data. It shows that the mean values have followed the same trend as those exhibited

when two-year average data were used.

The results for the K-S test presented in table 7-3b indicate that the data are not normally distributed. The results for the M-W test indicate that the mean difference for the return on shareholders equity (ROSER), the profit margin ratio (PMR), the earning margin ratio (EMR) and the earnings per share ratio (EPS) are still significant, but the significance level for (EPS) has declined to .05 when data covering longer time periods are used.

Table (7-3a)
Descriptive Statistics (Profitability Measures)
Three Years Before Acquisition

Variables		Mean	Skewness	kurtosis
Group 1	ROCER	16.29	2.77	11.61
2		15.37	2.15	11.02
1	ROSER	9.24	-5.71	50.99
2		8.70	-0.14	11.52
1	PMR	5.12	-1.77	5.09
2		5.73	0.76	2.88
1	CFMR	8.01	-2.34	11.47
2		8.31	1.16	5.39
1	EMR	2.37	-1.56	4.62
2		3.12	-0.01	4.24
1	TR	3.20	-2.94	10.14
2		2.70	3.03	13.08
1	EPS	7.21	-2.04	6.83
2		9.67	4.7	37.34

Table 7-3b
Statistical Tests (Profitability Measures)
Three Years Before Acquisition

Variables		K-S Z	M-W
Group	1 ROCER	1.86*	.13
	2	2.02*	
	1 ROSER	3.29*	1.94*
	2	2.71*	
	1 PMR	1.60*	2.13*
	2	1.50*	
	1 CFMR	1.69*	-1.51
	2	1.66*	
	1 EMR	1.60*	3.54**
	2	1.53*	
	1 TR	2.20*	1.17
	2	2.69*	
	1 EPS	1.41*	2.29*
	2	2.65*	

* significant at .05 level or less
* significant at .01 level or less

Table 7-4a presents the results for the same variables using four-year average data. The mean values for four-year averages for (ROCER), (PMR), (CFMR),(EMR) (TR) and (EPS) are greater for the non-acquired firms than for the acquired firms. The skewness estimation and kurtosis are high.

The results for the K-S presented in table 7-4b show that significant degree of skewness exists for all ratios. The M-W test presented in the same table indicate that only the (EMR) and the (EPS) variables are significant in differentiating between the acquired and the non-acquired firms.

Table (7-4a)
Descriptive Statistics (Profitability Measures)
Four Years Before Acquisition

		Variable	Mean	Skewness	Kurtosis
Group	1	ROCER	15.74	3.21	17.84
	2		14.81	1.65	7.32
	1	ROSER	8.57	4.71	38.51
	2		7.88	- .47	10.37
	1	PMR	5.18	1.84	5.14
	2		5.57	.89	3.17
	1	CFMR	6.02	1.27	1.85
	2		6.24	1.41	5.62
	1	EMR	2.37	1.50	4.84
	2		2.93	.23	4.17
	1	TR	3.16	3.03	11.05
	2		2.69	2.36	12.59
	1	EPS	6.89	2.17	7.78
	2		8.78	3.86	24.83

Table (7.4b)
Statistical Tests (Profitability Measures)
Four Years Before Acquisition

	Variables	K-S K	M-W
Group 1	ROCER	1.64*	- .15
2		1.90*	
1	ROSER	3.03*	-1.40
2		2.29*	
1	PMR	1.72*	-1.74
2		1.87*	
1	CFMR	1.52*	- .94
2		1.56*	
1	EMR	1.55*	-2.93**
2		1.59*	
1	TR	2.21*	-1.17
2		2.72*	
1	EPS	1.50*	-1.84*
2		2.54*	

* significant at .05 level or less
** *significant* at .01 level or less

The following table presents the results for the same variables but using five-year average data. The mean values for the variables exhibit the same trend as those for the previous years. The kurtosis and the skewness estimates are again high.

Table (7-5a)
Descriptive Statistics (Profitability Measures)
Five Years Before Acquisition

Variables		Mean	Skewness	Kurtosis
Group 1	ROCER	16.26	3.64	21.52
2		14.33	1.32	5.00
1	ROSER	8.42	4.40	35.53
2		7.17	- .25	7.24
1	PMR	5.42	1.45	4.91
2		5.35	.98	2.91
1	CFMR	6.01	1.04	2.62
2		6.12	1.48	6.12
1	EMR	2.36	- .42	10.78
2		2.72	.44	3.79
1	TR	3.10	2.93	15.90
2		2.68	2.94	12.26
1	EPS	6.64	2.36	9.70
2		8.09	3.60	21.23

At this point, it is worth noting that the Skewness and Kurtosis results reported in the above tables for the five year records of the non-acquired group were arrived at after removing the outliers. Those outliers have been identified using skewness and kurtosis estimates. The skewness estimates were -13.15, -13.66, -14.23 for the five

year average data for the profit margin ratio (PMR), cash flow margin ratio (CFMR) and the earning margin ratio (EMR) respectively. The kurtosis estimates were 190.55, 190.77, 211.85. By removing 15 firms, 6 per cent of the original sample size, an improvement in the distribution has occurred, and indeed, an improvement in the distribution of most ratios was shown. This result is in agreement with Frecka and Hopwood (1983) who concluded that removing outliers allows approximate normality to be achieved.

Table (7-5b)
Statistical Tests (Profitability Measures)
Five Years Before Acquisition

	Variables	K-S Z	M-W
Group 1	ROCER	1.77*	-1.18
2		1.65*	
1	ROSER	2.63*	- .16
2		2.02*	
1	PMR	1.61*	-1.03
2		1.92*	
1	CFMR	1.39*	- .60
2		1.63*	
1	EMR	1.69*	-1.93*
2		1.84*	
1	TR	2.26*	-1.27
2		2.85*	
1	EPS	1.53*	-1.10
2		2.49*	

* significant at .05 level or less

The above table provides the results for the M-W test which indicate that only the (EMR) has significant

mean value.

In conclusion, the above results show that there is a marked difference between the acquired and the non-acquired firms one year before acquisition for the return in shareholders equity ratio(ROSER), profit margin ratio (PMR), earning margin ratio (EMR), and earnings per share (EPS). Using these ratios, non-acquired firms are more profitable (at the .01 significance level). However, for the rest of the profitability measures the difference between the means ranks for the two groups is not significant. Hence, using one year data, the above measures support the inefficient management hypothesis stated in the previous chapter. The significance level is unchanged for EMR and EPS when two-year average data were used. Three years before acquisition, the significance level for ROSER, PMR, EMR and EPS has declined to .05. Four years before acquisition only EMR and EPS have a level of significance equal to .01 and .05 respectively. These significance levels decline to .05 for EMR in the fifth year.

Hence the profitability measures, at least on a univariate basis, proved to be more significant in differentiating between the acquired and the non-acquired firms when more recent data are used.

7.2.2 Descriptive Statistics and Univariate Analysis: The Asset Undervaluation Hypothesis

As mentioned in Chapter Four this, hypothesis of merger motive indicates that when a company underutilises its assets, or when its management does not operate at full potential, the companys' shares will be undervalued by the market. The argument follows that a low valuation ratio is an indication to the acquirer that it is more economical to expand its business by purchasing the undervalued firm than by expanding through internal investment. The null hypothesis to be tested using univariate analysis is that "there is no difference in the valuation ratio between the acquired and the non-acquired firms". The alternative hypothesis would be "the valuation ratio of acquired firms is lower than the valuation ratio of the non-acquired firms".

The market value to book value ratio has been used as a proxy measure for this hypothesis. The following table presents the descriptive statistics for this ratio over the five year period.

The figures show that the distribution of this ratio seems to indicate non-normality caused by varying degrees of skewness. The mean values for the acquired group is less than the mean value for the non-acquired and for 1,2,3,4 and 5 year data.

Table (7-6a)
Descriptive Statistics (Valuation Measures)
1,2,3,4 and Five Years Before Acquisition

Variables	Mean	Skewness	Kurtosis
One year before acquisition			
Group 1 *MV/BV	7.67	4.10	5.57
2	11.09	2.19	5.82
Two years before acquisition			
Group 1 MV/BV	7.75	3.65	17.74
2	9.94	2.26	6.68
Three years before acquisition			
Group 1 MV/BV	6.50	3.42	14.95
2	9.20	4.58	9.34
Four years before acquisition			
Group 1 MV/BV	6.05	3.11	12.05
2	8.56	2.72	10.99
Five years before acquisition			
Group 1 MV/BV	5.74	3.17	12.69
2	7.96	2.83	12.72

* MV/BV= the market value of the firm over the book value

The *results* for the M-W test are presented in the following table. They indicate a significant difference between the sample means for both groups and for all years' data. This gives support to the hypothesis that the acquired firms are undervalued. This supports the earlier finding that acquired firms are less profitable and that the management are not using their assets to the full extent possible to generate the amount of profit required.

Table (7-6b)
Statistical Tests (Valuation Measures)
1,2,3,4 and Five Years Before Acquisition

Variables			K-S Z	M-W Z
One year before acquisition				
	Group 1	MV/BV	2.78*	-4.62**
	2		2.53*	
Two years before acquisition				
	Group 1	MV/BV	2.59*	-4.18**
	2		2.56*	
Three years before acquisition				
	Group 1	MV/BV	2.26*	-3.71**
	2		2.59*	
Four years before acquisition				
	Group 1	MV/BV	2.12*	-3.44**
	2		2.16*	
Five years before acquisition				
	Group 1	MV/BV	2.22*	-3.09**
	2		2.61	

* significant at level .05 or less
** significant at level .01 or less

7.2.3 Descriptive Statistics and Univariate Analysis Price -Earning Magic Hypothesis

As mentioned in the previous chapter, this hypothesis indicates the existence of an instantaneous gain accruing to the acquirer when they acquire a company with a low P/E ratio. Hence, the hypothesis to be tested is that, "there is a difference in the P/E ratio between the acquired and the non-acquired firms". Or alternatively, "the acquired firms have a lower P/E ratio than the non-acquired firms". The following table presents the descriptive statistics for this variable. It shows that the distribution of this ratio indicates non-normality caused by skewness. The figures for the mean values are

higher for the non-acquired group than those for the acquired firms. However, carrying out the M-W tests indicates that the difference in the mean values is not significant as table 7-7b shows.

Table (7-7a)
Descriptive Statistics (P/E Ratio) 1-5 Year Data

Variables	Mean	Skewness	Kurtosis
One year before acquisition			
Group 1 P/E	17.66	5.42	40.21
2	20.08	5.28	37.12
Two years before acquisition			
Group 1 P/E	18.20	4.93	26.17
2	20.19	6.91	64.71
Three years before acquisition			
Group 1 P/E	19.70	3.66	14.70
2	18.10	4.81	29.89
Four years before acquisition			
Group 1 P/E	19.14	3.33	23.24
2	18.45	4.30	22.94
Five years before acquisition			
Group 1 P/E	17.19	3.11	10.11
2	18.41	3.13	12.83

Table (7-7b)
Statistical Tests (P/E Ratio) 1-5 Year Data

Variables	K-S Z	M-W Z
One year before acquisition		
Group 1 P/E	1.98*	- .65
2	4.00*	
Two years before acquisition		
1 P/E	3.18*	-1.21
2	3.39*	
Three Years before acquisition		
1 P/E	2.59*	- .69
2	3.18*	
Four years before acquisition		
1 P/E	2.18*	- .85
2	3.04*	
Five years before acquisition		
1 P/E	2.15*	-1.90
2	2.38	

* significant at .05 or less

7.2.4 Descriptive Statistics And Univariate Analysis Financial Synergy Hypothesis

As discussed in Chapter Four, financial synergy is said to be achieved through mergers. Mead (1969) hypothesised that a firm becomes an attractive merger candidate if its capital structure provides the acquiring firm with latent debt capacity. Therefore, measures of financial leverage have been used in the analysis. Another synergistic financial motive is obtained when a firm acquires a cash-rich firm to improve its own liquidity and to fund investment in the acquiring firm's existing business (Myers and Majluf, 1984). Liquidity ratios were used to test this hypothesis.

The null hypothesis to be tested is that "there is no difference in gearing between the acquired and the non-acquired firms". The second null hypothesis is "there is no difference in liquidity between the acquired and the non-acquired firms".

Two financial ratios have been used to measure gearing. The capital gearing ratio (CGR), and the Borrowing ratio (BR). Table 7.8a provides the descriptive statistics for leverage measures. For both ratios, the figures shows that the mean value for the acquired group is greater than the mean values for the non-acquired for all

five years, and that mean values for the (BR) for the acquired firms increased from .40 five years before acquisition to 0.49 one year before acquisition. The skewness and kurtosis estimates were not high, and were not significant for (CGR) as table 7-8b shows.

Table (7-8a)
Descriptive Statistics (Gearing Measures), 1-5 Year Data

Variables	Mean	Skewness	kurtosis
One year before acquisition			
Group 1 CGR	26.72	0.51	0.03
2	22.78	0.76	0.32
1 BR	0.48	3.06	11.98
2	0.41	7.59	75.71
Two years before acquisition			
1	26.71	0.44	-0.24
2	22.90	0.64	0.17
1 BR	0.49	-3.02	11.28
2	0.39	7.68	82.78
Three years before acquisition			
Group 1 CGR	26.60	1.02	2.22
2	22.88	0.59	0.04
1 BR	0.45	3.87	19.95
2	0.39	6.25	60.22
Four years before acquisition			
Group 1 CGR	26.48	2.17	10.29
2	22.54	0.60	1.13
1 BR	0.43	3.41	16.25
2	0.35	3.10	54.22
Five years before acquisition			
Group 1 CGR	25.67	1.85	6.66
2	22.38	0.57	-0.18
1 BR	0.40	3.02	12.93
2	0.39	5.49	6.12

CGR = capital gearing ratio
BR = borrowing ratio

The Figures for the K-S test provided in the following table indicates that for the borrowing ratio (BR) the distribution throughout the five years is non-normal.

Applying the M-W test, the results indicate that the difference between the mean ranks for the two groups is significant for the (BR) ratio one and two years before acquisition. Although the level of significance diminished for three, four, and five-year data, the mean value in table 7-8a show that acquired firms have a higher borrowing ratio.

As the distribution for the capital gearing ratio (CGR) approximates normality, a t-test has been applied to estimate the difference between the mean ranks for the two groups were significant. Using a .05 level of significance the results indicate that acquired firms are highly geared compared with the non- acquired firms when one, two, and three-year data was used. These results do not support Mead's (1967) hypothesis mentioned in the earlier chapter which states that "a firm becomes an attractive merger candidate if its capital structure provides the acquiring firm with latent debt capacity". But when four, and five-year data were used, the level of significance diminished. This again indicates that the firms' performances are not efficient and that the resources might be inefficiency employed.

Table (7-8b)
Statistical Tests (Gearing Measures), 1-5 Year Data

Variables		K-S Z	M-W Z/T Test
One year before acquisition			
Group 1	CGR	0.77	1.93*
2		1.48	
1	BR	2.29*	-1.99*
2		4.54*	
Two years before acquisition			
1	CGR	0.82	1.94*
2		1.24	
1	BR	2.31*	-2.05*
2		4.19*	
Three years before acquisition			
1	CGR	0.78	1.87*
2		1.14	
1	BR	2.36*	-1.54
2		3.61*	
Four years before acquisition			
1	CGR	1.03	1.97*
2		1.08	
1	BR	2.07*	-1.45
2		3.39*	
Five years before acquisition			
1	CGR	1.14	1.67*
2		1.08	
1	BR	1.89*	-1.32
2		3.65*	

* *significant at .05 or less*

The borrowing ratio has been used in Bougen and Drury (1980) to test the distribution for certain ratios. This study has achieved similar results to theirs.

The descriptive statistics for the liquidity measures are reported in the following table. The figures show that non-normality exists for all three measures and the K-S test supports this as shown in table 7-9a. Therefore, the M-W test has been applied.

Table (7-9a)
Descriptive Statistics (Liquidity Measures), 1-5 Year Data

Variables			Mean	Skewness	Kurtosis
One year before acquisition					
Group	1	COCL	.17	3.11*	1.57
	2		.24	3.61*	17.61
	1	QAR	.85	.85*	1.42
	2		.91	1.64*	4.94
	1	CSOCL	.23	2.93*	8.44
	2		.27	3.61*	16.35
Two Years before acquisition					
Group	1	COCL	.17	2.74*	7.82
	2		.25	4.76*	31.40
	1	QAR	.83	.78*	1.41
	2		.91	1.52*	4.48
	1	CSOCL	.23	3.20*	11.45
	2		.27	3.30*	13.05
Three years before acquisition					
Group	1	COCL	.21	5.86*	44.81
	2		.25	4.57*	27.87
	1	QAR	.86	4.26*	30.99
	2		.91	1.48*	3.72
	1	CSOCL	.26	4.31*	23.92
	2		.27	3.71*	17.88
Four years before acquisition					
Group	1	COCL	.21	6.86*	58.47
	2		.25	4.23*	23.05
	1	QAR	.87	5.67*	47.34
	2		.92	1.56*	4.25
	1	CSOCL	.21	6.66*	55.34
	2		.21	4.19*	24.26
Five years before acquisition					
Group	1	COCL	.23	8.04*	75.41
	2		.25	3.86*	18.79
	1	QAR	.90	7.25*	67.35
	2		.92	3.99*	22.59
	1	CSOCL	.27	6.74*	56.27
	2		.28	1.67*	4.98

*significant at .05 or less
** significant at .01 level or less
COCL=cash over current liabilities, QAR=current assets/ current liabilities, CSOCL= cash and securities/current Liabilities.

The mean values indicate that in all cases the non-acquired firms have higher liquidity than the acquired firms except for (CSOCL) in the fourth year which

is the same. However, the results reported in table 7-9b for the M-W test indicate that the differences between the mean ranks for both groups are not significant for all three measures i.e. cash over current liabilities (COCL), quick asset ratio (QAR), and Cash and securities over current liabilities (CSOCL).

Table (7-9b)
Statistical Tests (Liquidity Measures), 1-5 Year Data

Variables			K-S Z	M-W Z
One year before acquisition				
Group	1	COCL	3.01*	-1.59
	2		3.96*	
	1	QAR	1.01	-0.63
	2		1.66*	
	1	CSOCL	3.36*	-0.77
	2		4.22*	
Two years before acquisition				
	1	COCL	2.88*	-1.59
	2		4.18*	
	1	QAR	.93	-0.94
	2		1.81*	
	1	CSOCL	3.26*	-0.71
	2		4.09*	
Three years before acquisition				
	1	COCL	3.39*	-1.14
	2		4.19*	
	1	QAR	1.68*	-0.90
	2		1.70*	
	1	CSOCL	3.36*	-0.54
	2		4.18*	
Four years before acquisition				
	1	COCL	3.54*	-1.02
	2		4.14*	
	1	QAR	1.89*	-0.98
	2		1.88*	
	1	CSOCL	3.55*	-0.38
	2		4.18*	
Five years before acquisition				
	1	COCL	3,80*	-0.28
	2		4.01*	
	1	QAR	2.37*	-0.91
	2		1.93*	
	1	CSOCL	3.55*	-0.20

* significant at .05 level or less

These results do not support the earlier hypothesis that the acquired companies are cash rich firms and have been acquired to fund investment in the acquiring firm's existing businesses.

7.2.5 Descriptive Statistics and Univariate Analysis Size Hypothesis

According to this hypothesis the smaller the firm the higher the probability of this firm being an acquisition target. Three ratios were used to measure size. The book value of net assets, the market value of common equity and sales figures. Table 7-10a presents the descriptive statistics for these ratios. It shows that the distribution for all three measures is not normal, therefore the M-W has been applied. The mean values indicate that the acquired firms are smaller than the non-acquired firms, However, the Z values for the M-W test shown in table 7-10b are not significant for all size measures, which supports the hypothesis that size, at least in this particular stage of analysis, cannot be used to differentiate between the acquired and the non-acquired firms.

Table(7-10a)

Descriptive Statistics (Size Measures), 1-5 Year Data

Variables			Mean	Skewnes	Kurtosis
One year before acquisition					
Group	1	BVNASS	38314.00	4.39	23.49
	2		44863.76	4.41	24.74
	1	MVC	38642.41	4.21	21.51
	2		71376.06	4.61	29.23
	1	SALE	07537.51	3.25	12.54
	2		13756.90	4.22	19.83
Two years before acquisition					
Group	1	BVNASS	41825.71	4.59	26.01
	2		41848.31	4.25	23.01
	1	MVC	34379.41	4.32	23.26
	2		61018.58	4.78	30.42
	1	SALE	102964.33	3.15	11.68
	2		121190.79	4.12	19.81
Three years before acquisition					
Group	1	BVNASS	34584.46	4.72	27.63
	2		39904.90	4.03	20.16
	1	MVC	31473.30	4.56	26.20
	2		53832.27	4.91	35.41
	1	SALE	99054.40	3.27	12.52
	2		113735.09	4.06	19.36
Four years before acquisition					
Group	1	BVNASS	33756.53	4.72	27.75
	2		37835.61	3.85	17.55
	1	MVC	29285.48	4.50	25.34
	2		48187.63	4.87	34.09
	1	SALE	95721.24	3.27	12.38
	2		107374.33	4.22	21.69
Five years before acquisition					
Group	1	BVNASS	32383.66	4.51	24.91
	2		36123.45	3.78	16.43
	1	MVC	27450.04	4.55	25.97
	2		43302.85	5.01	36.15
	1	SALE	91568.89	3.26	12.17
	2		102694.13	4.44	24.50

BVNASS= book value of net assets equity, MVC= market value of common equity.

Table (7-10b)
Statistical Tests (Size Measures), 1-5 Year Data

Variable			K-S Z	M-W Z
One year before acquisition				
Group	1	BVNASS	3.62*	-0.07
	2		4.66*	
	1	MVC	3.37*	-1.65
	2		4.74*	
	1	SALE	3.01*	-0.51
	2		4.60*	
Two years before acquisition				
	1	BVNASS	3.41*	-0.01
	2		4.62*	
	1	MVC	3.37*	-1.21
	2		4.47*	
	1	SALE	2.93*	-0.51
	2		4.61*	
Three years before acquisition				
	1	BVNASS	3.41*	-0.11
	2		4.60*	
	1	MVC	3.33*	-0.89
	2		4.78*	
	1	SALE	2.96*	-0.67
	2		4.60*	
Four years before acquisition				
	1	BVNASS	3.42*	-0.51
	2		4.58*	
	1	MVC	3.33*	-0.63
	2		4.76*	
	1	SALE	2.97*	-0.72
	2		4.63*	
Five years before acquisition				
	1	BVNASS	3.38*	-0.21
	2		4.57*	
	1	MVC	3.33*	-0.43
	2		4.78*	
	1	SALE	2.98*	-0.72
	2		4.69*	

* significant at .05

7.2.6 Descriptive statistics and Univariate Analysis Funds Flow Measures

For funds flow measures, the results in table 7-11a show that for all measures the skewness and kurtosis

estimates are high. The mean values indicate that a difference exists between the acquired and the non-acquired firms. The M-W test produced in table 7-11b indicates a significant difference between the mean ranks for both groups for one-year data for the variables, funds generated from operation over the market value (FGFO/MV),total sources over sales(TS/S), total sources over the market value (TS/MV) and total sources over the book value (TS/BV). Using two-year averages, only the FGFO/MV and TS/S TS/MV have significant Z values. For three-year average data only FGFO/MV and TS/S have significant Z value. This level of significance declines to .05 when four years' records were used and only the FGFO/MV measure is significant when five-year data was used. This variation in the significance level for different ratios when different data records are used might be related to significant variations in the financial positions of the two groups, which is due to the fact that funds flow statement information reflects the changes in the financial position of the firm during the financial year. The fact that the FGFO/MV ratio was shown to be significant over both the short and long term records is because such a measure reflects the real value of the firms' operation or activities and might be an important variable in developing the final classification model for mergers.

Table (7-11a)
Descriptive statistics (Funds Flow Measures)
1-5 Year Data

	Variables	Mean	Skewness	Kurtosis
One year before acquisition				
Group 1	FGFO/S	.08	2.46	8.66
2		.09	.73	1.77
1	FGFO/MV	.28	5.39	38.44
2		.17	5.37	50.51
1	FGFO/BV	.23	1.75	7.51
2		.23	1.88	10.85
1	TS/S	.10	1.69	3.49
2		.13	3.65	19.27
1	TS/MV	.39	5.11	32.27
2		.28	3.79	23.45
1	TS/BV	.29	1.94	6.66
2		.34	3.33	21.91
1	MILF/S	.01	4.73	39.74
2		-.00	-3.17	24.02
1	MILF/MV	.06	2.56	11.78
2		.02	2.18	15.98
1	MILF/BV	-.01	.31	6.96
2		.01	.31	4.96
Two years before acquisition				
Group 1	FGFO/S	.08	2.30	7.88
2		.08	.97	2.70
1	FGFO/MV	.29	5.66	37.29
2		.21	3.31	22.95
1	FGFO/BV	.23	2.00	6.66
2		.23	2.60	14.52
1	TS/S	.10	1.59	3.94
2		.13	5.89	47.62
1	TS/MV	.38	4.86	29.89
2		.30	3.13	16.11
1	TS/BV	.30	-8.96	93.63
2		.56	-1.45	16.86
1	MILF/S	.01	.76	11.60
2		-.01	1.37	68.44
1	MILF/MV	.01	2.33	13.76
2		.01	.66	10.06
1	MILF/BV	-.01	-1.58	7.54
2		.01	1.37	9.83

FGFO= fund generated from operations, MV=market value of common equity, S= sales figures, BV= the book value of common equity, TS total sources, MILF=, net movement in liquid fund.

Continue Table (7-11a)

Three years before acquisition				
Group	1	FGFO/S	.08	2.11	7.25
	2		.08	1.13	3.04
	1	FGFO/MV	.29	5.15	33.60
	2		.23	2.72	14.79
	1	FGFO/BV	.23	2.16	6.63
	2		.22	2.36	10.99
	1	TS/S	.10	2.51	9.74
	2		.13	6.72	65.14
	1	TS/MV	.36	5.08	30.80
	2		.31	2.66	12.24
	1	TS/BV	.29	2.80	11.75
	2		.31	1.76	4.61
	1	MILF/S	.00	.37	12.71
	2		-.01	-1.84	11.06
	1	MILF/MV	.01	2.67	14.84
	2		.01	.70	10.77
	1	MILF/BV	-.01	-1.10	8.06
	2		.01	.80	7.08
four years before acquisition					
Group	1	FGFO/S	.08	2.01	6.42
	2		.08	2.71	10.99
	1	FGFO/MV	.29	4.53	31.24
	2		.23	2.85	16.74
	1	FGFO/BV	.22	2.11	8.70
	2		.22	1.82	6.50
	1	TS/S	.10	2.24	7.64
	2		.13	5.27	40.38
	1	TS/MV	.37	4.83	29.72
	2		.32	2.66	13.76
	1	TS/BV	.28	2.71	10.63
	2		.29	.21	3.25
	1	MILF/S	.00	-.47	10.41
	2		.00	-1.19	5.99
	1	MILF/MV	.02	- .47	10.41
	2		.02	3.93	32.59
	1	MILF/BV	-.01	1.54	12.72
	2		.01	1.07	9.93

Continue Table (7-11a)

Five years before acquisition				
Group	1	FGFO/S	.07	1.74	5.25
	2		.08	1.48	4.08
	1	FGFO/MV	.31	5.55	42.01
	2		.24	2.99	18.04
	1	FGFO/BV	.18	-8.04	81.51
	2		.21	1.75	5.87
	1	TS/S	.09	2.24	7.70
	2		.12	4.41	28.02
	1	TS/MV	.41	5.32	36.63
	2		.32	3.08	18.29
	1	TS/BV	.26	-4.54	44.62
	2		.28	1.74	5.43
	1	MILF/S	.01	.26	6.74
	2		.00	-1.27	4.66
	1	MILF/MV	-.01	-0.68	-7.89
	2		-.02	.31	15.17
	1	MILF/BV	.02	8.60	84.96
	2		.01	.71	9.05

Table (7-11b)
Statistical Tests (Funds Flow Measures)
1-5 Year Data

Variables			K-S Z	M-W Z
One year before acquisition				
Group	1	FGFO/S	1.80*	-1.99*
	2		1.70*	
	1	FGFO/MV	2.89*	-4.00**
	2		2.97*	
	1	FGFO/BV	1.09	-0.45
	2		1.67*	
	1	TS/S	1.77*	-2.42**
	2		2.56*	
	1	TS/MV	2.76*	-2.39*
	2		2.79*	
	1	TS/BV	1.31*	-1.87*
	2		2.34*	
	1	MILF/S	1.95*	-0.29
	2		2.36*	
	1	MILF/MV	1.97*	-0.03
	2		2.83*	
	1	MILF/BV	1.30*	-0.81
	2		1.39*	

Continue (Table 7-11b)

Two years before acquisition				
	1	FGFO/S	1.75*	-1.77
	2		1.71*	
	1	FGFO/MV	2.84*	-3.66**
	2		2.66*	
	1	FGFO/BV	1.43*	-0.01
	2		2.16*	
	1	TS/S	1.38*	-2.35**
	2		3.30*	
	1	TS/MV	2.69*	-2.11*
	2		2.86*	
	1	TS/BV	4.27*	-1.57
	2		3.33*	
	1	MILF/S	1.39*	-0.16
	2		3.46*	
	1	MILF/MV	1.80*	-0.04
	2		2.24*	
	1	MILF/BV	1.15	-0.49
	2		1.89*	
Three years before acquisition				
	1	FGFO/S	1.76*	-1.84
	2		1.86*	
	1	FGFO/MV	2.57*	-2.33**
	2		2.66*	
	1	FGFO/BV	1.64*	- .05
	2		2.04*	
	1	TS/S	1.65*	-2.54**
	2		3.14*	
	1	TS/MV	2.96*	- .95
	2		2.61*	
	1	TS/BV	1.95*	-1.26
	2		2.30*	
	1	MILF/S	1.56*	- .24
	2		1.64*	
	1	MILF/MV	1.62*	- .83
	2		2.33*	
	1	MILF/BV	1.56*	- .35
	2		1.52*	
Four years before acquisition				
	1	FGFO/S	1.68*	-1.47
	2		2.05*	
	1	FGFO/MV	2.45*	-2.33**
	2		2.66*	
	1	FGFO/BV	1.54*	- .26
	2		1.79*	
	1	TS/S	1.67*	-2.04*
	2		3.10*	
	1	TS/MV	2.60*	-1.05
	2		2.78*	
	1	TS/BV	1.88*	- .93
	2		2.06*	

continue (Table 11-b)

	1	MILF/S	1.73*	-1.33
	2		1.90*	
	1	MILF/MV	1.03*	-1.53
	2		3.38*	
	1	MILF/BV	1.40*	-1.50
	2		1.42*	
Five years before acquisition				
	1	FGFO/S	1.43*	- .81
	2		1.98*	
	1	FGFO/MV	2.47*	-2.64*
	2		2.63*	
	1	FGFO/BV	3.54*	- .13
	2		1.72*	
	1	TS/S	1.69*	- .96
	2		2.92*	
	1	TS/MV	2.41*	-2.30
	2		2.74*	
	1	TS/BV	2.67*	- .06
	2		2.12*	
	1	MILF/S	1.53*	.04
	2		1.68*	
	1	MILF/MV	1.29*	- .22
	2		2.51*	
	1	MILF/BV	3.31*	- .24
	2		1.47*	

* Significant at .05 or less
** Significant at .01 or less

7.3 SUMMARY AND CONCLUSIONS

The univariate analysis for the data have indicated that the acquired firms group can be differentiated from the non- acquired firms using some of the financial ratios considered. The above results indicate that between the period 1980-1986, the acquired firms have low profitability, high gearing ratio, low liquidity and low valuation ratios when they are compared

with the non-acquired group.

The examination of the distribution of the ratios has indicated that many ratios are not well described by a normal distribution. This is caused by varying degrees of skewness and the existence of extreme outliers. The K-S tests support these findings and it has been found that by removing outliers the distribution of some ratios ia able to approach approximate normality.

In this study the problem of non-normality will be ignored and no transformation procedures will be used, as transformation might change the inter-relationship between variables and may affect the relative position of the observations in a group. A variable that is a significant discriminator may not be so after it has been transformed. Hence, this study will assume that the classification procedures employed are robust to non-multivariate normality. This strategy is supported by Gilbert (1968) and followed by many business researchers. On the other hand, by the use of logit analysis, which does not assume multivariate normality, it is hoped to shed light on the effect of data distribution on the results reached when multivariate discriminant analysis is used.

CHAPTER EIGHT

EMPIRICAL RESULTS DISCRIMINANT ANALYSIS AND LOGIT ANALYSIS

8.0 INTRODUCTION

The first section of this chapter presents the results of the study using the multivariate discriminant analysis (MDA) statistical procedure. While the univariate analysis presented in the previous chapter has given an indication of the important factors that could be used to differentiate between the two groups (the acquired and the non-acquired), the multivariate approach adopted in this chapter has been used to complement this approach. The use of (MDA) arises because using the variables in conjunction with each other might produce clearer distinctions between the two groups. More important is the fact that the acquisition process involves more than one ultimate motive, hence a good discriminator on a univariate basis may not be so on a multivariate basis. Equally important, the multivariate approach provides a clearer picture of the relative importance of each variable in the final classification function. The second section will report the results obtained from conducting the logit

technique for data analysis.

This chapter begins with a re-introduction to the methodological steps involved in sample selection and sample analysis. Next, the methodological steps in multivariate analysis are presented. The results of such analysis are then discussed and compared with the results from the univariate analysis to support the earlier mentioned objective for applying the multivariate approach. Finally the most accurate classification model will be presented along with the implications of the classification results with regard to the hypotheses considered and the classification accuracy of such a model.

8.1 METHODOLOGICAL STEPS IN SAMPLE SELECTION

As mentioned in Chapter Six, a total of 118 firms for which there was complete data available on DATASTREAM, and which had been acquired during the period 1980-1986 are used in this study. The non-acquired group consisted of 224 companies. The original sample consisted of 239 companies, however 15 companies were removed from the analysis at the univariate stage presented in Chapter Seven to improve the distribution of the data. When selecting the non-acquired group it was ensured that at least one company from the same industry as the acquired companies

was included in the sample and that over representation of one industry was kept as low as possible. Appendix 1 provides a list of companies in the acquired group. Criteria for inclusion in the present study were: (1) the stock of the company are /were publicly traded (2) the companies belong to the manufacturing and retail industries (3) published financial statements were available for five years prior to the acquisition date. The reasons behind imposing these conditions were justified in Chapter Six. Although such selection criteria have been applied in most of the bankruptcy and merger prediction studies, they all share the problem of parameter estimation biases (Zmijewski, 1984). This bias results from "oversampling" acquired firms or what is generally referred to as choice-based sampling bias. The second bias results from using a complete data sample selection criteria which is referred to "sample selection bias". In this study the first bias though not completely eliminated, was greatly reduced as the ratio of acquired firms to non-acquired was kept to match that existing in the real world. The archive survey originally indicated that the number of acquired companies during the period 1980 to 1986 was 510 whilst the number of non-acquired was 1420. Hence the ratio of acquired firms to the total population was 34 per cent. However, the availability of data for the acquired sample has reduced the number of acquired companies surveyed to 118. Therefore, to maintain the same proportions, the number of

non-acquired (224 firms) were selected randomly from the 1420. The second bias resulting from the use of a complete data sample selection is said to be solved when Maximum likelihood procedure is adopted. Hence the use of logit analysis which applies full maximum likelihood procedure in the next stage of the analysis will overcome this estimated bias (Palepu, 1986). The following section describes the discriminant analysis and variables reduction procedures used in this study.

PART I

8.2 DISCRIMINANT ANALYSIS PROCEDURES AND ASSUMPTIONS

Discriminant analysis is concerned with the problem of classifying an object of unknown origin into one of two or more distinct groups or populations on the basis of observations made on it (Eisenbeis and Avery, 1972).

Statistically, the decision rule is obtained by maximising the ratio of between- group to within- group variance-covariances of the discriminant variables in the model. In the two-group case, the decision rule yields a linear discriminant function which maps the multidimensional characteristics of the objects (represented by the discriminant variables) into a

unidimentional measure represented by the discriminant score such that maximal separation between the two groups can be achieved. The function in the case of two groups has the following mathematical form

$$Z = b_j X_i + b_2 X_2 + \ldots + b_m X_m$$

Where

X_i = the ith attribute of independent variable (j=1,2,3,m)

b_j = the discriminant function coefficient for the ith attribute

Z = the discriminant score.

The assumptions for discriminant analysis and the ways to handle it have been discussed in Chapter Six. Before presenting the linear discriminant analysis results, the following section presents another important issue related to the selection of final predictor variables entering the discriminant function.

8.3 FINAL PREDICTOR VARIABLES SELECTION TECHNIQUES

As discussed in Chapter Four the lack of a generally accepted theory of mergers and the difficulty in determining the ratios that can be used as the best surrogate measures have contributed to the selection of a large number of predictor variables. Research evidence has

shown that financial variables are highly correlated with one another (Pinches, Mingo, and Carruthers, 1973). The intercorrelations among variables in a discriminant analysis is referred to as multicollinearity. Multicollinearity is usually viewed as a major contributor to the instability of a discriminant model across samples (Zavgren 1983). However, Cochran (1964) showed that negative and positive intercorrelations may be exploited to increase discriminant power. In other words, multicollinearity is not a problem in discriminant analysis.

There are a variety of ways to reduce the set of variables. Among the popular ways are the use of factor analysis. An alternative means is to employ a stepwise method. Stepwise procedures can be applied to both discriminant analysis models and logit models by allowing the program to select variables based on the contribution of a variable toward some criterion (i.e. the variable that contributes most in separating the two groups will be selected first by the stepwise procedure). In any application of discriminant analysis, some variables will show greater variation between groups relative to their variation within groups, than other variables. These variables will therefore provide better discrimination between groups than others.

The SPSS "Wilks" stepwise method was used in this study as the primary variable reduction technique. This process involves the following steps:

1-The analysis starts with an initial subset of variables in the discriminant analysis. Possibilities include the empty set and the full set of all variables.

2-The first variable included in the analysis has the largest accepted value for the selection criterion. After the first variable is entered, the value of the criterion is re-evaluated for all variables not in the model, and the variable with the largest acceptable criterion is entered next. At this point, the variable entered first is re-evaluated to determine whether it meets the removal criterion. If it does, it is removed from the model.

3-A test on each variable not included in the discriminant function for possible inclusion in the equation is carried out, followed by examination of the variables in the equation for removal. Variables are removed until none remain that meet the removal criterion. Variable selection

terminates when no more variables meet entry or removal criteria.

In this study the default tolerance level of .001 was used as a criteria for inclusion or removal of variables during the analysis.

The main practical drawback to the stepwise procedure is that it is unlikely that it will yield the optimum subset of variables. Another drawback is that the stepwise procedure only produces one subset, where as in practice there may be a number of subsets that perform equally well or even better (Klecka 1980). In this study another selection procedure is used. The variables which have been found to be important in the univariate analysis will be used as a direct input to the discriminant function.

8.4 MULTIVARIATE DISCRIMINANT ANALYSIS FOR THE DATA

In this section four sets of models are presented. The first set consists of five discriminant functions, each function representing 1,2,3,4, or five year average data. In this first set only those variables which have proved to be significant in differentiating between the two groups (the acquired and the non-acquired) using the univariate

analysis procedure explained in Chapter Seven are used. For multiple discriminant analysis the direct or forced entry method is used in calculating the discriminant function. The aim is to ascertain whether the coefficients of these variables will prove significant when all the significant variables enter the analysis. In the second set of models the five functions will be calculated using all the predictor variables that were used as proxy measures for the hypotheses mentioned earlier. The fund flow measures were not included in the analysis whereas in the third set of models these measures were included. The purpose was to test the usefulness of this information in acquisition prediction. This is conceived to be important as recent research has been conducted into the use of funds flow information in predicting corporate failure (Gentry, Newbold and Whitford 1987) but not in predicting corporate acquisitions. The fourth set of models will include the use of industry-relative ratios, created by dividing a firm's ratio by the industry's average ratio.

8.4.1 Statistics for the First Set of Models

At this stage of the analysis the aim is to test the hypotheses mentioned earlier. As each hypothesis was tested individually using a univariate analysis procedure, it is now important to test these hypotheses jointly. To

achieve this aim only those variables which have been significant in differentiating between the two groups using univariate analysis will be used in the multivariate analysis using direct entry method. The results are displayed in table (8.1a). This table presents the results of the standarised discriminant function coefficients (SDFC) for each variable. The (SDFC) are those that maximise the ratio of between-group to within-group sums of squares. They were calculated using the "direct" or forced entry method in discriminant analysis (for more information about this method see SPSS, Advanced statistics manual, and Tatsuoka, 1971). The term standarised indicates that each variable score is standarised then multiplied by the discriminant function coefficient.

The results presented in this table indicate that, for one-year data, the variables which entered the final classification model with the highest value of the correlation coefficients are earning margin ratio (EMR), profit margin ratio (PMR), and market value to book value ratio (MV/BV). These three significant discriminators have been used as proxy measures for the inefficient management hypothesis and the asset undervaluation hypothesis respectively. For other variables, the results indicate that although they were significant discriminators in the univariate analysis, their contribution in multiple analysis is less important. The same results have been

achieved when two and three-year data were used. For four year averages the sets of variables that entered the analysis have changed as was the case in univariate analysis. Only the capital gearing ratio (CGR) has a significant coefficient. This ratio is used as a proxy measure for the financial synergy hypothesis. Table 8.1b presents the canonical discriminant functions for each years' model.

Table (8.1a)
Standarised Canonical Discriminant Function Coefficients

variables	Coefficients	Variables	coefficients
1 year before acquisition		2 years before acquisition	
ROSER	-.34	ROSER	- .29
BR	.28	BR	.13
PMR	-4.79	PMR	-4.16
CGR	- .39	CGR	- .34
EPS	.04	EPS	.0
MV/BV	.53	MV/BV	.57
EMR	4.98	EMR	4.20
3 years before acquisition		4 years before acquisition	
ROSER	- .29	CGR	.58
PMR	-4.01	MV/BV	- .40
CGR	- .24	EPS	- .27
EPS	.09	EMR	.19
MV/BV	.51	TSS	- .46
EMR	4.08	FGFOMV	.43
5 years before acquisition			
CGR	.52		
MV/BV	- .48		
EMR	.01		
FGFOMV	.55		

ROSER=return in shareholders equity.
BR=borrowing ratio.
PMR=profit margin ratio.
CGR=capital gearing ratio.
EPS=earnings per share.
MV/BV=market value to book value of common equity.
EMR=earning margin ratio.
FGFOMV=funds generated from operation/market value.

For five-year data (CGR) and funds generated from operation (FGFOMV) both have significant coefficients.

Table (8.1b)
Canonical Discriminant Functions

Model No.	Eigenvalue	Canonical Correlation	Wilks Lambda	Signi.
1	.24	.44	.80	.000
Percent of 'groups' cases correctly classified		70.59%		
2	.19	.40	.84	.000
Percent of 'groups' cases correctly classified		70.00%		
3	.14	.35	.89	.002
Percent of 'groups' cases correctly classified		65.45%		
4	.10	.20	.93	.005
Percent of 'groups' cases correctly classified		63.54%		
5	.04	.16	.95	.006
Percent of 'groups' cases correctly classified		59.00%		

The conclusion that can be drawn from such results is that, although a number of financial variables have proved to be significant in a univariate analysis, not all of them have proved significant when they were used in multivariate analysis. Hence, using univariate analysis to draw a general conclusion about the collective characteristics of acquired firms might not be valid.

8.4.2 Statistics for the Second Set of Models

In this second set of models all the financial ratios that were originally collected and used as proxy measures for alternative hypotheses will enter the classification model. However, to be able to solve the multicollinearity problem between the variables, 'Wilks, stepwise analysis' method is used. The steps involved in this analysis were explained in section (8.3). Table 8.2a presents the results for one-year data.

The variables which discriminate most effectively between the two groups are earnings margin ratio (EMR), Profit margin ratio (PMR), and the return on shareholders equity (ROSER). These three significant discriminators and the others (CFM, TR) are all used as proxy measures for the inefficient management hypothesis. Hence using one year data the above measures give support to the inefficient management hypothesis stated in Chapter Four.

The inclusion of other variables in the discriminant function such as price earnings ratio (PER), cash over current liabilities (COCL), market value to book value (MV/BV) and the inclusion of the dummy variable (DUMY1) lend support to the price earning ratio hypothesis, the asset undervaluation hypothesis and the Growth resources imbalance hypothesis respectively.

Table (8.2a)
Standarised Canonical Discriminant Function
Coefficients, One Year Before Acquisition

Variables	Coefficients
PER	.24990
CGR	.27368
ROSER	- .69585
ROCER	.33888
TR	- .18931
COCL	.20547
CFMR	- .23353
PMR	-5.86514
MV/BV	.40412
EMR	6.24109
DUMY1*	- .22114

*DUMY1=this variable is produced using measures of liquidity, leverage, and growth, and used as a proxy measure for the growth resources imbalance hypothesis.

Table 8.2b presents the results for the average of two year's before acquisition. Ten financial variables have entered the final discriminant function compared to eleven in the first model.

Table (8.2b)
Standarised Canonical Discriminant Function
Coefficients, Two Years Before Acquisition

Variables	Coefficients
PER	.16
ROCER	.20
TR	.35
COCL	-.23
CFMR	.32
PMR	3.79
CGR	.19
MV/BV	-.60
EMR	-3.91
DUMY2	.25

The above table indicates that the variables which discriminate most effectively between the two groups are: earnings margin ratio (EMR), profit margin ratio (PMR), and the market value to book value ratio (MV/BV) the contribution of the other profitability variables has shown a decline. The return on shareholders equity (ROSER) has been removed from this model, while the significance level has decline to .05 when univariate analysis was used. The elimination of this variable from the second model might be due to the fact that this measure is a better reflection of the current performance of the management team relative to different economic events.

Table 8.2c presents the results for data averaged through three consecutive years prior to acquisition. The results for the standarised discriminant function coefficients are presented. The number of variables that entered the final discriminant function decreased to eight variables.

Table (8.2c)
Standardised Canonical Discriminant Function Coefficients, Three Years Before Acquisition

Variables	Coefficients
PER	.20
ROCER	.25
TR	.36
COCL	-.16
PMR	4.01
CGR	.21
MV/BV	-.63
EMR	-3.90

This table indicates that the variables which discriminate most effectively between two groups are: profit margin ratio (PMR), earnings margin ratio (EMR), and the market value to book value (MV/BV). The two variables removed from the function are: the cash flow margin ratio (CFMR), and the dummy variable. The removal of the dummy variable which had been used as a proxy measure for the growth resources imbalance hypothesis, indicates that the the importance of the dummy variable has been recognised when more recent data were used.

Table 8.2d presents the results for the average of four year's data before the acquisition for each ratio. The number of variables entering the final discriminant function has declined to seven.

Table (8.2d)

Standardised Canonical Discriminant Function Coefficients, Four Years Before Acquisition

Variables	Coefficients
MV	-.90
ROCER	.58
TR	.26
CGR	.31
EPS	-.25
MV/BV	-.53
BVNASS	.75

The above table indicates that the variables which discriminate most between the two groups are: the market

value of the firms' outstanding shares (MV), the book value of net assets (BVNASS), the return on the capital employed (ROCER), and the market value to book value ratio (MV/BV). These variables have been used as proxy measures for the size hypothesis, the inefficient management hypothesis, and the asset undervaluation hypothesis.

Table 8.2e presents the results when five-year average data before acquisition has been used.

This table indicates that the variables which discriminate most effectively between the two groups are: profit margin ratio (PMR), earning margin ratio (EMR), and market value of the outstanding companies shares (MV). The market value of the companies share has been used as a proxy measure for the size variable. The other size variable which has been included in the final discriminant function is the book value of net assets.

This and the results in table 7.2d might lend support to the argument that firms use size as a defence strategy to avoid the threat of being acquired by the bigger competitors and hence they themselves are getting bigger as the threat approaches more closely.

Table (8.2e)

Standardised Canonical Discriminant Function Coefficients, Five Years Before Acquisition

Variables	Coefficients
MV	-.59
GR	-.19
ROCER	.41
TR	.34
PMR	3.29
CGR	.26
MV/BV	-.48
BVNASS	.49
EMR	-3.16

8.5 SELECTION OF THE BEST MODEL

The eigenvalue, the canonical correlation and Wilks' Lambda will be used for the purpose of choosing the best model that produces the optimal classificatory power. The eigenvalue is the 'between-group' variance divided by the 'within-groups' variance. It is used as a statistical indicator for evaluating the predictive ability of the model. An eigenvalue of 0 means that the discriminant function has no classificatory power, whereas an eigenvalue around 0.40 is considered acceptable. The eigenvalue for the first model was 0.44, as table 8.3 shows. The eigenvalue for the second, third ,fourth and fifth are; 0.21, 0.16, 0.13, 0.07. Hence, when using the above set of financial variables, only the first model has a high discriminant power.

The canonical correlation squared is the ratio of the 'between groups' variance scores of the discriminant function to the total variance score, It is an accurate a good measure of how well the function discriminates between groups on a scale ranging from 0.0 to 1.0. The value for the first, second, third, fourth and fifth models are, 0.55, 0.41, 0.37, 0.34, 0.25 respectively. Thus, this supports the conclusion drawn from the estimation of the eigenvalue.

Wilks lambda is the 'within group' sum of squares divided by the total sum of squares. This ratio can vary from 0 to 1. The smaller the Wilks' lambda, the better the discriminant power of the model. Table 8.3 indicates that the first model has the lowest Wilks' Lambda. This again indicates that the first model has the highest discriminant power.

Although only the one-year data provides an acceptable model of classification based on eigenvalue, however, using 2, 3, 4, and five years' data provides significant results and classification accuracy ranging from 70.2 per cent to 60.1 per cent. The classification result for the best model as shown in table 8.3 is 73.1 per cent.

Table (8.3)

Canonical Discriminant Functions For The Five Models

Model NO.	Eigenvalue	Canonical Correlation	Wilks' Lambda	Signi.
1a	.44	.55	.69	.000
Percent of 'groups' cases correctly classified	73.1%			
2b	.21	.41	.82	.000
percent of 'groups' cases correctly classified	70.2%			
3c	.16	.37	.85	.000
Percent of 'groups' cases correctly classified	66.5%			
4d	.13	.34	.88	.000
Percent of 'groups' cases correctly classified	66.45%			
5e	.06	.25	.93	.002
Percent of 'groups' cases correctly classified	60.1%			

a The variables and coefficients for this model were presented in table 8.2a.
b The variables and coefficients for this model were presented in table 8.2b.
c The variables and coefficients for this model were presented in table 8.2c.
d The variables and coefficients for this model were presented in table 8.2d.
e The variables and coefficients for this model were presented in table 8.2e

8.6 STATISTICS FOR THE THIRD SET OF MODELS

A third set consisting of five models were estimated using the funds flow variables (funds generated from operations/sales, funds generated from operations/market value, funds generated from operations/book value, total sources/sales, total sources/market value, total sources/book value, movement in liquid funds/sales, movement in liquid funds/book value and movement in liquid funds/market value) and all the other variables. Using the stepwise selection method, the analysis has produced the following canonical discriminant functions presented in table (8.4).

Table (8.4)
Canonical Discriminant Functions For the Five Models, Using Funds Flow Measures.

model No.	Eigenvalue	Canonical Correlation	Wilks' Lambda	Signf.
1	.49	.59	.64	.000
2	.23	.43	.80	.000
3	.18	.39	.84	.000
4	.19	.40	.83	.000
5	.16	.37	.85	.000

The results presented in this table indicate that the use of funds flow measure increases the classificatory

power of all the models. This supports the findings of the bankruptcy studies mentioned earlier, which examined the usefulness of this information on bankruptcy prediction models.

8.7 STATISTICS FOR THE FOURTH SET OF MODELS

Dietrich and Sorensen (1984) have argued that many ratios vary across industries. Therefore, using ratios from different industries might affect the results from statistical procedures such as multivariate analysis. For example; if an industry is characterised by high leverage it does not mean that none of the firms in the industry are viable merger targets. Indeed, a highly leveraged firm may have relatively low leverage when compared to the industry norm. It has also been argued that the distribution of the financial ratios might be closer to normality if industry- relative ratios are used (Platt and Platt, 1990). So to follow the logic of such arguments it was decided to divide the individual ratios by the industry average.

In this study the firms were classified using the Stock Exchange Classification (SEC), DATASTREAM is found to use the same classification when calculating the industry averages. However, the industry averages could not be found for many ratios including earnings per share (EPS)

and market value to book value ratio MV/BV.

As the one year figures have produced the most efficient classification method, it was decided that industry-relative ratios would be calculated for one year only. The standarised coefficients and the classification function are presented in the following table;

Table (8.5)
Standarised Canonical Discriminant Function Coefficients, Industry-Relative Ratios

Variables	Coefficients
BVNASY1N	.52
CFMY1N	.33
QARY1N	.45
TRY1N	.39
SALEY1N	.77
EMRY1N	1.31

-Canonical Discriminant Function=
Eigenvalue .38, canonical correlation.31
wilks lambda .90 significance level=.000

-Percent of'grouped' cases correctly classified 70%

The above table indicates that the variables which discriminate most between the two groups are: earning margin ratio (EMRY1N), book value of assets employed (BVNASY1N), and the sales figure (SALEY1N). The eigenvalue is .38, but the function is significant and the classification accuracy is 70 per cent.

The general conclusion that can be drawn when a comparison is made between the results in this table and the results in table 8.2a is that, using industry-relative ratios does not improve the classification coefficient nor does it help in producing a better classification model. The possible reasons for this might be related to the fact that the two samples consisted of highly diversified companies and that no obvious industry effect was captured by the financial information produced by these firms.

8.8 SUMMARY AND CONCLUSIONS

The above analysis has indicated the usefulness of accounting information in merger classification when the most recent data is used. It also indicates the existence of different attributes that are important in the acquisition classification model. In the model with the highest classificatory power (the model were one-year data was used and the funds flow measures were allowed to enter the stepwise analysis) the inefficient management hypothesis, the asset undervaluation hypothesis and also the resources imbalance hypothesis have been supported by the empirical evidence. However, the relatively poor discriminant power of the other models might be an indication of the existence of different factors that affect the acquisition process which the present study

could not identify. Other reasons for the relatively poor classificatory power of these models might be related to the use of the stepwise discriminant criteria in selecting the final predictor variables.

The second part of this chapter presents the results of the logistic regression analysis that has been used as an alternative method of data analysis.

PART II

EMPIRICAL RESULTS
LOGIT ANALYSIS

8.9 LOGIT ANALYSIS

The second part of this chapter presents the results of the study using the logit technique, as an alternative statistical analysis procedure to MDA, to develop the different sets of acquisition classification models.

The majority of U.K. studies on corporate acquisition has used discriminant analysis. None of these studies reported results of the examination of the distribution of the financial ratios used in the analysis. In this study, the condition of multivariate normality of the variables is not fulfilled. Although some evidence exists which supports the use of discriminant analysis even when this condition is not met it was decided to apply the logistic analysis to determine whether there will be an effect on the classification accuracy of the models.

Hence, logit analysis was employed because of its frequently cited conceptual advantages relative to multiple discriminant analysis (e.g. Zavgren 1985).

Generally, logit models estimate the probability of occurrence of a choice or outcome of an event under study. It derives the probability of a binary response variable by using coefficients on the independent variables. The linear logistic model has the following form:

$$Pr(y) = 1/[1 + \exp\{-(Ó + ßX)\}]$$

Where Pr(y) is the probability of a firm being acquired, X is the set of independent variables, Ó is the intercept parameter, and ß is the vector of slope of parameters (Maddala 1977).

The coefficients can be interpreted as the effect of a unit change in an independent variable on the probability of the dependent variable. The coefficients derived from the conditional probability models estimate the representative effects of population parameters on the outcomes in the population. If these derived coefficients are applied to the attribute vector of an individual firm in the sample the resulting index measures the 'propensity to acquisition', conditional on the firm's attribute vector.

The logit model was estimated using the maximum likelihood method. It can be seen that the value of the likelihood in the above equation depends upon the values of the unknown parameters Ó and ß which are to be estimated. This is done by taking as parameter estimates those values which maximise the overall value of the likelihood. In other words, the maximum likelihood method involves choosing those parameter values which would be most likely to have produced the observed sample of response category choices in the data set.

8.9.1 Final Predictor Variables selection Technique

As mentioned in Chapter Four, the lack of a generally accepted theory of mergers and the difficulty in determining the ratios that can be used as the best surrogate measures have contributed to the selection of a large number of predictor variables. In this study 27 financial ratios were used as proxy measures for different sets of hypotheses. Hence, this study will use the stepwise procedure applied in discriminant analysis. By applying this method only those variables that maximise the explanatory power of the function are included in the final model.

The (SAS) Stepwise Logistic Regression package has been used to carry out this analysis. A forward stepwise procedure was utilised with a probability of chi-square for removal of variables with a tolerance level of 0.001 being specified (for more information refer to SAS User Manual version 6.4). The results are produced in the following sections. In this section three sets of models are presented. The first set of models consists of five functions, each function represents 1,2,3,4, or five-year average data. All predictor variables that were used as proxy measures for the hypotheses mentioned earlier are included. The funds flow measures were not included. In the second set the funds flow measures were included. The third set of models include the industry -relative ratios in the analysis.

8.9.2 Statistics for the First Set of Models

All the financial ratios that were originally collected and used as proxy measures for alternative hypotheses will enter the classification model. The Stepwise logistic regression procedure has been used to solve the problem of multicollinearity. Table 8.6a presents the results.

Table (8.6a)
Results Of The Stepwise Logistic Regression
One Year Before Acquisition

A. Variables Entering the Model	Coefficients	Signf.
MV/BV	7.80	.005
COCL	5.12	.023
TR	4.77	.028
B.Model Statistics, Model ChiSquare=20.15 with 3 degree of freedom (P=.005).		
C. percent of 'group' cases correctly classified 69.1%		

MV/BV=the market value to book value of common equity.
COCL=cash/current liabilities ratio.
TR=turnover ratio.

The results presented in this table indicate that, for one-year data, the variables which discriminate most effectively between the two groups are market value to book value (MV/BV), cash/current liabilities (COCL), and Turnover ratio (TR). These sets of variables represent a subset group of those that entered the classification model using discriminant analysis (see table 8.2a). Hence using one-year data the above results support the assets under-valuation hypothesis, and the inefficient management hypothesis. The model classification accuracy is 69.1 per cent which compared with 73.1 per cent achieved using discriminant analysis as reported in the first part of this chapter. This difference is probably related to the number

of variables that entered the final classification model.

Table 8.6b presents the results for the two-year average data before acquisition. The same three financial variables have entered the final function.

Table (8.6b)
Results of the stepwise logistic regression
Two Years before acquisition

A.Variables Entering the Model	Coefficients	Signf.
MV/BV	7.33	.01
COCL	5.62	.01
TR	4.90	.02
B. Model Statistics, Model Chi Square=17.15 with 3 degree of freedom (P=.006).		
C. percent of 'group' cases correctly classified 65.5%		

The results in this table indicate that the same sets of variables have entered the final classification model with a slight change in the coefficient figures. The classificatory power of the model has declined. These variables are a subset of the set of variables that entered the final classification model using discriminant analysis (see table 8.2b). The classification accuracy of the model using discriminant analysis was higher 70.20 per cent, compared to 65.5 per cent achieved using logistic regression.

Table 8.6c presents the results for data averaged through three consecutive years prior to acquisition. Again the same variables have entered the final discriminant function.

Table (8.6c)
Results of The Stepwise Logistic Regression
Three Years Before Acquisition

A.Variables Entering the Model	Coefficients	Signf.
MV/BV	7.89	.01
TR	5.32	.02
COCL	4.47	.03
B.Model Statistics, Model Chi Square=15.30 with 3 degree of freedom (P=.006).		
C.percent of 'group' cases correctly classified 65.3%		

Table 8.6d presents the results for the average of four-year data before acquisition. The number of variables entering the model has increased to four variables. The return on capital employed (ROCER) has been added to the list. This variable did not enter the final classification model using MDA (see table 8.2d), instead, the variable (ROSER) which represents the same profitability measure entered the MDA model.

Table (8.6d)
Results of The Stepwise Logistic Regression
Four Years Before Acquisition

A. Variables Entering the Model	Coefficients	Signf.
MV/BV	7.17	.007
TR	4.67	.030
COCL	5.05	.024
ROCER	4.30	.038
B. Model Statistics, Model Chi Square=21.39 with 4 degree of freedom (P=.002).		
C. percent of 'group' cases correctly classified 69.60%		

The classification accuracy of the model has also increased to 69.60 per cent. The classification accuracy reported in table 8.3 using MDA showed a slight increase in the classification accuracy when using four years average.

Table (8.6e)
Results Of The Stepwise Logistic Regression
Five Years Before Acquisition

A. Variables Entering the Model	Coefficients	Signf.
MV/BV	6.65	.009
ROCER	4.55	.002
COCL	4.35	.037
B. Model Statistics, Model Chi Square=20.1 with 3 degree of freedom (P=.006).		
C. percent of 'group' cases correctly classified 69%		

The above table outlines the results for the five-year data. The variables that have entered the model give support to both the assets under-valuation hypothesis, and the inefficient management hypothesis. The same hypotheses were supported using MDA, but as reported in table 8.2e the variable COCL did not enter the final classification model. There have been changes in the set of variables entering the final logit classification model using data covering 1,2,3,4 or 5 year averages of data when the multivariate discriminant analysis is used. In addition, the changes in the variable set entering the final classification model using logistic regression again lends support to the nature of the statistical properties of the data and the violation of the required assumptions for MDA to be used.

8.9.3 Statistics for the Second Set of Models

The following table reports on the coefficients and the accuracy of the five models produced using funds flow measures alongside other variables using the stepwise logistic procedure for analysis. accuracy of the five models.

The results in this table indicate that the use of funds flow measures provides a slight increase in the classification accuracy for models using one, four and five-year data. This same increase in classification

accuracy was reported when MDA was used.

Table (8.7)

Results Of The Stepwise Logistic Regression Using Funds Flow Measures

Model No.	Model Chi-square	Signf.	Variables Coefficients
1	20.45	.005	FGFOMV= 4.30
percent of'grouped' cases correctly classified 69%			
2	none of the fund flow measures entered the final model		
3	none of the fund flow measures entered the final model		
4	22.10	.002	MILFMV= 3.93
Percent of 'grouped' cases correctly classified=69.85%			
5	20.32	.004	FGFOASEY5=4.35
Percent of 'grouped' cases correctly classified=69.20%			

8.9.4 Statistics for the Third Set of Models

Following the same arguments of section 8.6, the final set of models in this section have used the industry-relative ratios in the analysis. The results are presented in the following table:

Table (8.8)
Results of The Stepwise Logistic Regression
One Year Data,Industry-Relative Ratios

A. Variables Entering the Model	Coefficients	Signf.
FGFOSN	6.49	.009
TRN	5.64	.002
EMRN	4.72	.037
TAN	4.57	.032
B. Model Statistics, Model Chi Square=20.1 with 4 degree of freedom (P=.006).		
C. percent of 'group' cases correctly classified 69.2%		

FGFOSN=fund generated from operations
TRN=turnover ratio
EMRN=earning margin ratio
TAN=total assets employed

The above table indicates that the variables which discriminate most between the two groups are: funds generated from operation/ sales (FGFON/S), turnover ratio (TRN), the earnings margin ratio (EMRN) and the total assets employed figure (TAN). Although the set of variables are a subset of that provided when discriminant analysis was used, the general conclusion is the same as that provided using MDA. The use of industry-relative ratios does not improve the classification accuracy of the model nor does it help to improve the explanatory power of the model.

8.10 SUMMARY AND CONCLUSION

The general conclusions that can be drawn when a comparison is made between the results in the first part of this chapter and those given in the second part is that the use of the logistic procedure for statistical analysis of the same set of data has affected the classification accuracy of each set of models. For all sets of models, the classification accuracy produced by the logistic procedure has shown a decline. The reason for this could be related to the argument developed regarding the assumptions of multivariate discriminant analysis being violated. On the other hand, the relatively poor classificatory and explanatory power of the models provided might be an indication of the existence of different factors that affect the acquisition process which the present study could not identify.

CHAPTER NINE

CONCLUSIONS

9.0 INTRODUCTION

Merger activity is a process which takes place because of the interaction of several elements in the market. These include the macroeconomic conditions, the legal environment and the political environment. Regardless of the different characteristics of each of the merger waves described in Chapter Two, there has however been an important common theme running through the history of merger activity in the U.K.. High levels of merger activity have always been associated with high levels of economic activity. The decades of extensive acquisition have, in general, been prosperous decades, but fewer acquisitions occurred in periods such as the 1930s or 1970s and early 1980s when the world economy grew relatively slowly. Taking a short term view, it has been observed that a marked correlation between share price levels and merger activity exists. Chapters Two and Four discussed these issues.

The main objective of this study was to provide information about the financial profile of firms acquired during the period 1980-1986. Chapter Two provided information on merger waves that occurred during earlier decades and highlighted the different nature of the 1980s wave. A notable feature of the merger activity occurring during this period was the high rates of vulnerability of large companies to take-over. The recent boom in merger and acquisition activity differs from previous waves, not only in terms of its increased scale, but also in terms of the type of organisational combinations it has produced. Unlike the last wave of merger in the early 1970s when most combinations were of the conglomerate type, during the current wave, mergers and acquisitions have been of a horizontal type.

Further, an attempt has been made to determine if this profile of financial characteristics of the observed firms provides a useful criterion for identifying those firms with a high probability of being acquired at a later date.

Information has been provided on the distribution of the financial ratios that were used in this study. In addition the study explores the usefulness of funds flow measures in merger classification studies. Although this issue has been examined in bankruptcy studies, it has not

been examined in previous research in the area of mergers and acquisitions.

To achieve these objectives, an examination of certain merger theories and hypotheses which suggested the usefulness of particular attributes of a firm as a means of specifying merger classification models was made.

These hypotheses were:

- The inefficient management hypothesis
- Assets undervaluation hypothesis
- Price-earning ratio hypothesis
- Financial synergy hypothesis
- Firm size hypothesis
- Growth resources imbalance hypothesis

A sample of 118 U.K. acquired firms and a total of 224 non-acquired firms was used. Twenty seven financial ratios were used as proxy measures for the above mentioned hypotheses. Information about the sample design and data collection procedures was provided in Chapter Six. The data analysis was carried out in three stages: the first stage involved the use of univariate statistical technique, where both parametric and non-parametric statistical tests were employed. Chapter Seven provided the results of this analysis. The second stage of the analysis involved the

use of multivariate discriminant analysis as the main technique for developing the classificatory models for mergers. Logit analysis was used in the third stage to overcome some of the problems associated with the data distribution assumption alleged to affect the classification accuracy of the models produced using multivariate discriminant analysis. Chapter Eight provides the results of both analyses.

9.1 PRIOR RESEARCH

The discussion in Chapter Three indicated that classificatory and predictive approaches in accounting have been used to evaluate the usefulness of accounting information. The predictive approach has long been used to predict corporate bankruptcy (Beaver 1966, Altman 1968, Taffler and Tisshaw 1977, and Peel and Peel 1988). It has been used in Bond premium and bond rating decisions (Fisher 1959), and has also been used to evaluate the bank lending decision (Libby 1975). These studies amongst others, were intended to give information about the most relevant accounting measure with the greatest predictive or classificatory power. Chapter Five provided a review of the use of this approach in merger and acquisition prediction studies. Although this type of research has its limitations, the contribution of such research to the development of an accounting system that can operate

effectively and efficiently should be recognised. The Corporate Report published in 1974 by the Accounting Standards Committee on the objectives of the corporate report stated that the objectives are " to communicate economic measurements of and information about the resources and performance of the reporting entity useful to those having reasonable right to such information". Foster (1986) explained that these objectives indicate the need for information to be used in the decision making process relating to either the 'investment focus' or the 'stewardship focus'. Bearing in mind the fact that accounting information is provided by entities which are operating within an environment which is affected by economic, legal and political decisions throughout the years of their existence, the reporting process is of necessity, a dynamic one. The needs of users are changing and probably becoming more sophisticated. Therefore, the reporting of accounting information should be adjusted to meet these new needs as they arise. Continuous assessment of the use of accounting information in this type of research conducted at different periods of time can help in the adjustment process.

The characteristics and the nature of merger activity is also changing over time. The continuous reporting of these changes is of great importance to the legislative body (i.e. the Merger and Monopoly Commission)

which will be concerned with the effects of mergers and acquisitions on concentration and competition within industries and how this is likely to affect the shape of the economy.

9.2 FINDINGS FROM THE EMPIRICAL STUDY

This section is devoted to providing a comprehensive summary of the research findings from which conclusions are thereafter drawn. Some of the findings provide an indication of the complexity of the merger process, whereas other findings indicate those areas in which further data collection and analysis would be most appropriate. The results of this study, presented in Chapters Seven and Eight, provide new evidence about the characteristics of the firms involved in the merger process during the latest merger wave.

A series of findings were reached based upon the research results. These findings reflect the objectives of the study and will be presented according to the stages of the analysis to which they apply.

The first stage of data analysis involved the use of univariate analysis. Data for one year prior to merger and for averages of the previous 2,3,4, and five years were

used in the analysis of the 27 ratios provided in Appendix 3, which were used as surrogate measures for the six main hypotheses mentioned earlier. For the inefficient management hypothesis the results indicated that using one-year data, and for profitability measures such as returns on shareholders equity (ROSER), profit margin ratio (PMR), earnings margin ratio (EMR) and earnings per share (EPS), the mean differences are significantly less for the acquired group when compared with those for the non-acquired. The significance level has declined to .05 for the variables ROSER and PMR when two-year records were used. The significance level is unchanged for EMR and EPS when two-year averages were used. Three years before acquisition the significance levels for ROSER, PMR, EMR and EPS have declined to.05. Four years before acquisition only EMR and EPS were significant and the significance declined in the fifth year. Hence the univariate analysis has provided the evidence that profitability measures are more significant in differentiating between the acquired and the non-acquired firms when more recent data is used.

For the asset undervaluation hypothesis, the results have indicated a significant difference between the two sample means for all years. This gave support to the hypothesis that the firms acquired during the period 1980-1986 were undervalued.

The hypothesis which stated that an instantaneous gain is achieved when a company with a high P/E ratio acquires a company with a low P/E ratio has been rejected.

For the financial synergy hypothesis, the univariate analysis indicated that the difference between the mean values of the two groups is significant for the borrowing ratio (BR) one and two years before acquisition. The results were significant for capital gearing ratio (CGR) one, two and three years before acquisition. For liquidity measures, the results indicated that the difference between the means of the two groups are not significant for all three measures i.e. cash /current liabilities (COCL), quick asset ratio (QAR), and cash and securities/ current liabilities (CSOCL). This does not support the hypothesis that the acquired companies are always cash-rich firms.

When testing the size hypothesis, the univariate analysis has indicated that none of the measures used produced significant results when discriminating between the two groups.

Therefore the general conclusion from univariate analysis indicated that between 1980-1986 the acquired firms had low profitability, high gearing ratios, and low valuation ratios when compared with the non-acquired firms.

The results provided by this univariate analysis are, on the whole, similar to those found by a major research in the field conducted by Kuehn (1975) for the period 1957-1969. Six financial variables were used: (1) valuation ratio;(2) size;(3) profit ratio;(4) retention;(5) liquidity and (6) growth ratio.

According to Kuehn the valuation ratio was found to be significant at the industry level for a majority of industries and at the aggregate level. This result that the likelihood of takeover increases as the valuation ratio decreases. The results for the profit ratio and the growth ratio showed that both are important indicators of whether or not the firm will be taken over. Kuehn's results indicated that neither size nor liquidity were found to be significant in differentiating between the two group.

Kuehn applied profit analysis in a univariate way to estimate the probability of acquisition and he did not report on the classification accuracy of the models produced. Thus a comparison with the multivariate results which are provided by the present study are not possible.

Another important result to emerge from the univariate analysis is concerned with ratio distribution. An examination of the distribution of the ratios used in this study indicated that many ratios are not well described by a normal distribution. This was caused by varying degrees of skewness and the existence of extreme outliers.

The second stage of the analysis involved the use of linear discriminant analysis (LDA) to develop the final classification models for the study. Four different sets of models were presented. The first set consisted of five discriminant functions, each function representing 1,2,3,4, and five-year average data. In the first set, only those variables which proved to be significant in differentiating between the two groups (the acquired and the non-acquired) using univariate analysis were included. The aim was to establish whether these variables would continue to prove significant when they all enter the model.

The second set of models were calculated using all predictor variables that were selected as proxy measures for the earlier mentioned hypotheses. The funds flow measures were not included in the analysis.

In the third set of models the funds flow measures were included in the analysis. The aim was to assess the usefulness of this type of information in merger classification studies. This question is important as recent research has been conducted into the use of funds flow information in predicting corporate failure, but not in predicting corporate acquisitions.

The fourth set of models included the use of industry-relative ratios, created by dividing a firm's ratio by the industry's average ratio.

The statistical analysis used in developing these models was presented in part one of Chapter Eight. The eigenvalue, the canonical correlation and Wilks's lambda have been used for the purpose of choosing the model that produces the highest classificatory accuracy and the highest explanatory power. As shown in section 8.5, table 8.3., the model with the highest classificatory power is the one developed using all ratios (excluding funds flow measures) and using data from one year before acquisition. The eigenvalue was reported to equal 0.44 and the classification accuracy was 73.1 per cent. When introducing the funds flow measures in the third set of models as indicated in section 8.6, the classificatory power had increased to 0.49 as shown in table 8.4 while the classification accuracy had risen to 74 per cent.

In the model with the highest classificatory power the inefficient management hypothesis, the asset undervaluation hypothesis and the resources imbalance hypothesis were supported by the empirical evidence.

For the third stage of the analysis, the logistic stepwise statistical procedure was used to develop three sets of models. The method of logit analysis has recently been used in business and accounting research as an alternative to discriminant analysis. Ohlson (1980) suggested logistic regression as an alternative to MDA, and he reported more accurate predictions of bankruptcy using this method than were achieved when using MDA.

There are a number of advantages to the use of logit in comparison to MDA when analysing a dichotomous dependent variable. The major advantage of logistic regression is that the method does not require distributional assumptions about the independent variables. Another stated advantage of the logit model is that the model gives an unambiguous classification between merged and non-merged firms because it applies a probability procedure in assigning the dependent variable to the different groups. While this advantage is frequently cited as significant, MDA also allows the probability of an event to be computed via a Bayesian adjustment. However, if the assumptions of multivariate normality and equal

dispersion matrices are violated, MDA probability estimates are biased (Zavgren 1985). The results of logit analysis were presented in the second part of Chapter Eight.

Three different sets of models have been developed using logit analysis. The model with the highest classificatory power was the one where four-year average data has been used and including all the 27 variables. This model was arrived at using a stepwise logistic procedure. The model classificatory power was 21.39 and the classification accuracy was 69.60. When funds flow measures were allowed to enter the model the classificatory power had risen to 22.10 while the classification accuracy had risen to 69.85. These results were reported in tables 8.9.1d and 8.9.2.

In this model the asset undervaluation hypothesis as well as the inefficient management hypothesis were supported by the evidence. However, using one year data, the classification accuracy declined to 69.61 per cent using logistic regression compared to 73.1 per cent when MDA was used.

9.3 EXPLANATIONS OF THE RESULTS

To be able to offer an explanation to the above results it is important to acknowledge the following methodological issues: The investigation in this study involves the classification of observation (firms) into discrete categories (acquired, non-acquired) by using a statistical technique. In this type of research certain assumptions have to be fulfilled. The effect of violation of the assumptions on the classification results is difficult to assess in absolute terms. Equally important is the lack of a general theory of merger thus making the interpretation of the result uneasy and difficult to generalise. Furthermore, the issues raised related to the motives for merger has indicated that this process involves human behaviour elements. As human behaviour changes and evolves over time, it would be difficult to predict this behaviour and indeed it would be difficult to explore behavioural aspects that are relating to mergers' motives and decisions.

The model's classificatory power when using both the MDA and the logit techniques (0.49 = eigenvalue for MDA and 22.1= model chi-square for logit analysis), were significant but their explanatory power seems to be small. This could be related to the fact that the lack of a comprehensive theory of merger has resulted in some

important variables not being included in the classification model.

The decline in the classification accuracy of the best model when logit analysis was used could be related to the violation of the multivariate normality assumption which could have resulted in an over-estimated classification accuracy. Using logit analysis provides the support for such an argument. Indeed the violation of MDA assumptions might have caused the higher classification accuracy reported by other researchers (Eisenbeis 1977).

9.4 CONCLUSIONS AND IMPLICATIONS

The undernoted conclusions and their implications for the development of mergers theory have emerged from this study. Other conclusions are related to the statistical methodology employed by this study and finally, a conclusion is reached on the usefulness of information other than accounting statement information in merger studies.

The present study was concerned with providing information about the characteristics of firms acquired during the period 1980-1986. This period witnessed a new merger wave which was different from those which occurred

during the previous decades. For example, the size of the premium paid to the acquired companies is much higher, there have been new merger rules introduced and also new techniques to fight unwanted bids have been developed. This has led to the belief that firms are being acquired for different reasons than was the case during the earlier period, and the use of accounting and market information can successfully identify the acquired from the non-acquired firms.

The size hypothesis has been the dominant hypothesis identified in the previous merger waves. Most of the studies conducted in the United Kingdom and the United States (e.g. Stevens 1973) indicated that the acquired firms are smaller than the non-acquired firms. Singh (1971) indicated that profitability and size are the most important discriminators and not the valuation ratio. However, the present research has strongly indicated, throughout the different stages of its analysis, that the asset undervaluation hypothesis and the profitability hypothesis are the most important discriminators and not the size hypothesis. The lack of support for the size hypothesis could have implications for future studies concerning the issue of why mergers fail or for studies of profitability of mergers. Future research should concentrate on the size of the acquired firms and relate this variable to the aftermath of mergers in term of

profitability and other organisational changes. If the size element has proved to be important, future research should take the argument further and endeavour to look at the integration of large firms into the existing organisational structure of the acquiring firm. Issues related to cultural aspects, and the process of integrating different management styles after the merger should also be considered.

The findings that the asset undervaluation hypothesis and the profitability hypothesis are the most important discriminators provide empirical evidence that, in the new merger wave, companies and industries became obsolete and inefficient, and that the takeover process might have brought about a new modern structure to solve the problems of maturity and inefficiency. The above findings also support the notion that in each merger wave different sets of motives predominate and finding the reasons why mergers occur in waves could contribute more to the establishment of a comprehensive theory of merger by uncovering further motives for corporate mergers which previous studies, including this one, have not investigated.

Another major contribution of this study is related to the issue of the statistical distribution of other financial ratios in addition to those studied by previous

researchers such as Bougen and Drury (1980) and Ezzamel et al (1987) (for more details on these studies see Chapter Seven). The examination of the distribution of these ratios indicated that many ratios are not well described by a normal distribution. This is caused by varying degrees of skewness and the existence of extreme outliers (see Appendix 7 for graphic presentation of ratio distributions). It has also been found that removing these outliers helps the distributions of some ratios to approximate normality.

The results of applying the logistic regression procedures for model development supported previous evidence on the importance of the multivariate normality assumption when discriminant analysis procedure is used (Eisenbeis 1977).

The use of funds flow measures in the analysis has contributed to the classification accuracy of the models when one-year data was employed. Although this has previously been applied to bankruptcy predictions, its contribution to mergers research has not been tested in any previous U.K. study.

9.5 LIMITATIONS OF THE STUDY

Recognition of the limitations of this research is important because it qualifies the findings, and provides a rationale for the areas recommended for future research. The results and findings of this study should be viewed in the light of the following limitations:

First, the unavailability of the accounts for the acquired firms has resulted in complete reliance on DATASTREAM as the main source of ratios to be used as proxy measures for the earlier mentioned hypotheses. Using such computerised sources of information involves many problems including recording errors and different calculation procedures for different ratios.

Secondly, there are problems or limitations related to the methodology. Bearing in mind that some of the merger motives explained in Chapter Four are unique and can only be related to individual mergers, the findings and their contributions to merger theories could have been enhanced if a case study approach had been deployed in conjunction with the historical approach conducted in this study. This would have allowed the use of a richer data source.

Thirdly, the lack of theoretical justifications for assigning the best measures for certain hypothesis led the researcher to use multiple indicators for every hypothesis. The use of a stepwise procedure as a means to limit the number of the indicators and to avoid the problem of multicollinearity could have led to a non-optimal set of variables.

9.6 SUGGESTIONS FOR FUTURE RESEARCH

The above research has operated under the assumption that the population of acquired firms was homogeneous with respect to the underlying motivations for merger. The characteristics identified as significant discriminators between the acquired and the non-acquired firms were identified with the implicit assumption that all acquiring firms employed the same merger selection criteria (i.e. operate under a uniform set of merger motives). A study which involves the characteristics of acquiring firms could have produced more information about the motivations for mergers and could have identified a different set of merger theories and hypotheses.

The inclusion of other sectors in the sample in which the acquisition process was active, such as the financial services, and banking sectors would have helped

to uncover more information about the determinants of acquisition targets across a wider industry base.

As explained in Chapter Four, the study covered the period 1980-1986. However prior to 1979 the United Kingdom had suffered a number of years of extremely high inflation. In the aftermath, a period of minor recession followed before the economy recovered at the beginning of 1982. Using two different samples for the two different sub-periods (i.e. 1980-1982, and 1983-1986) could have led to an improvement in the classification results for the discriminant models.

In addition, future research could look at those firms which were subject to an acquisition but where the acquisition was subsequently abandoned. Looking at the financial profile of those firms and comparing them with the profile of firms which were acquired can produce new evidence on merger motives

The high rate of merger failure which has led to an increase in the demerger process should give future researchers an incentive to look at reasons for such failure. An interesting area of research could be the direct or indirect test of psychological motives. For example, " making an acquisition or merger can be a good career move for those recognised as having been responsible

for that decision" (Cartwright and Cooper 1992 p.19). Therefore direct or indirect tests of hubris theory and an examination of non-financial factors such as management turnover, remuneration and incentive plans available for the acquiring firms could provide more information on the managerial theory of mergers. Although this issue has been addressed and examined in a few US. studies, this issue has not yet been examined in the U.K.

Other non-financial information such as the percentage of institutional shareholders and their influence in the merger decisions, and the volatility of trade in the acquired firm's shares before acquisition provide more accurate representation of the performance of the management team. These factors could contribute more to the development of mergers classification and prediction models.

As indicated earlier, the use of funds flow measures in the analysis has contributed to the classification accuracy of the models. It was in 1974 that SSAP 10 was issued to outline 'the practice of providing source and application of funds statements as a part of audited accounts and to lay down a minimum standard of disclosure in such statements'. However this standard has been considered for revision on a number of occasions since then. In 1989 the ASC decided that SSAP 10 should be

reviewed to take into account the changing economic environment which had led to increasing sophistication in the requirements of users of financial statements. Research had indicated the existence of dissatisfaction with the current standard's pronouncements in certain areas. For example, critics felt that reporting on the movements of cash flows would be more useful than reporting on the changes in working capital (more information on the shortcomings of SSAP10 's requirements are provided in Accounting Standards 1991-92, p. 746).

Other criticisms are related to the interpretation placed on 'funds'(See UK GAAP, 1991). In practice UK companies have used the following interpretations; net liquid funds; working capital; net borrowing; and total external financing. The Accounting Standard Board on September, 1991 recognised this problem in interpretation and issued the Financial Reporting Standard No.1 ' -Cash Flow Statements' (the FRS) which establishes standards for cash flow reporting. It supersedes SSAP10- and requires reporting entities to prepare a cash flow statement as part of their financial reports. Future research on the usefulness of accounting information in mergers and bankruptcy prediction studies and in loan lending decisions can use this cash flow information to highlight its usefulness.

Mergers and takeovers of the 1980s have been partly influenced by the internationalisation of the world economy. The expansion and liberalisation of the European Community has increased the significance of the international dimension. Chapter Two provides statistics on the increase in merger activity within the European Community during the 1980s. The Single European Act, which became effective in 1987, and required the Commission to bring forward actions which would achieve the completion of the internal market by December 1992, contributed to this increase. This will also affect the nature of the individual markets within the European Community. It will affect the relative cost positions of different competitors within the existing markets. Firms exporting to EC and having units located in other EC states will find their costs reduced, relative to their competitors or firms outside the Community which do not have such subsidiaries of linkages.

With the onset of 1992 and the single European market, an issue of great importance to be addressed is the market for corporate control. This market will operate on a wider scale involving different types of skilful managers with international vision. The desire to acquire might be motivated less by concerns related to concentration of production and marketing capabilities and more by the belief that the acquirer can make better use of the assets

than the targets' management. Hence, addressing the issue of the determinants of merger activity at the domestic or international level should take into account the nature of this market. The level of supply and demand in this market could be foreseen if elements relating to the management team performance and individual skills are evaluated and considered as important elements in the merger process.

The analysis of the international operation of an enterprise could be at the top of the list for the acquiring firms as they search for acquisition targets. Hence, using financial information related to international or foreign sales in merger classification studies could prove to be more important than domestic sales figures.

Another important implication of the internal market is that it may facilitate the entry of new competitors into markets that were previously closed, or unattractive. This will result in further changes in the motives for mergers and exploiting these markets could be another important factor.

The discussion provided throughout the study indicated the existence of a wide range of motives for merger, and the empirical results discussed earlier in this chapter suggested that these motives are changing over time. The effect of macroeconomic, political, and legal

environments have been considered as an important factors leading to these changes. This study has provided information about the characteristics of U.K. firms acquired during the period 1980-1986. The results provided by this study and the suggested research areas presented earlier are hoped to contribute to the future development of a comprehensive theory for merger activity.

APPENDIX 1

list of Acquired Firms

	Acquired	Activity	Date
1-	AAA Industries plc	18	May,1982
2-	Armitage Shanks Group(Ltd)	14	Oct.1980
3-	Aeronautical & General Instrument plc	35	Dec.1984
4-	Aero Needles Group plc	27	Feb.1984
5-	Adams &Gibbons plc	42	Aug.1985
6-	Automotive Products Plc	41	Jan.1986
7-	Brickhouse Dudley	21	May.1986
8-	British Vending Industries	49	Apr.1986
9-	Brown John plc	27	-- .1986
10-	Bestobell plc	27	Jul.1986
11-	Bootham Engineers plc	27	Jun.1986
12-	Border Breweries	45	-- 1984
13-	Bevan DF(Holdings)	32	May.1986
14-	Benn Brothers plc	53	Jun 1983
15-	Barton Gruop plc	34	May.1983
16-	Bishop's Group plc	51	Dec.1983
17-	Brady Industries plc	14	Aug.1982
18-	Braid Group plc	42	Jul.1982
19-	Baker's Household Stors (leeds)	58	May.1984
20-	B.P.M Holdings plc	52	Nov.1984
21-	Bell Arthur & Sons plc	46	Aug.1985
22-	Bath and Portland Group	11	Dec.1984
23-	Brengreen (Holdings)	74	Aug 1986
24-	Brooke Bond Group	49	-- 1985
25-	British Home Store	55	Nov.1985
26-	Comet Group	58	Apr.1984
27-	Currys Group plc	58	Nov.1984
28-	Camrex Holdings.	16	May 1983
29-	Comben Group	18	Jun.1984
30-	Causton (sir Joseph) & Sons	53	Dec.1984
31-	Crosby Woodfield plc	27	Mar.1984
32-	Copydex plc	73	Jun.1984
33-	Cullen's Stores plc	51	Nov.1984
34-	Christie-Tyler plc	38	Aug.1985
35-	Chubb & Son plc	44	Oct.1984
36-	Clay (Richard)plc	53	Nov.1985
37-	Churchbury Estates	86	Dec.1984
38-	Cope Allman International	73	Mar.1986

39-	Comfort Hotels		-- 1984
40-	Denbyware Limited	40	Apr.1981
41-	Drake &Scull Holdings plc	18	Sep.1983
42-	Dreamland Electrical	39	-- 1983
43-	Downs Surgical plc	76	Feb.1984
44-	Decca Limited	35	Mar.1980
45-	Dixon David Group Clothing	59	May 1986
46-	Dew, George Plc	18	Sep.1986
47-	Duport plc	66	May.1986
48-	Elson & Robbins plc	38	Nov.1984
49-	Energy Services Plc	19	May.1985
50-	East Lancashire Paper Group	54	Dec.1984
51-	First Castle Electronics	35	Jan.1986
52-	Firmin & Sons	59	Nov.1983
53-	Fairclough Costruction	18	Dec.1982
54-	Fairdal Textiles Ltd	59	Oct.1982
55-	Francis Industries plc	27	Nov.1984
56-	Foster Brothers Clothing	58	Mar.1985
57-	Grattan plc	57	Jul.1986
58-	G.B Papers plc	54	Feb.1984
59-	Green's Economiser Group	22	Jun.1983
60-	Gelfer A&J plc	59	Jun.1986
61-	Glossop, W.and J	51	-- 1984
62-	Hiltons Footwear Ltd.	64	Nov.1981
63-	Heal & Sons Hold.	56	Mar.1983
64-	Huntleigh Group (The)	11	Aug.1983
65-	Hield Brothers Ltd.	61	Jun.1981
66-	Haden Plc	29	May.1985
67-	House of Frasers plc	55	Mar.1985
68-	Hoskins & Horton Plc.	11	Jan.1985
69-	Home Charm Group	58	Mar.1986
70-	Hinton (Amos) &Sons Plc	51	-- .1984
71-	Imperial Group	63	Feb.1986
72-	ICL plc	35	Aug.1984
73-	I.D.C Group plc	18	May.1985
74-	Initial	54	-- 1983
75-	Jackson (J.&H.B.)	34	Mar.1985
76-	Kenning Motor Group	42	Apr.1986
77-	Lennons Group	51	Sep.1984
78-	London Brick	12	Feb.1984
79-	Lake & Elliot	21	Feb.1985
80-	Link House Publication	52	Nov.1984
81-	Lancaster,D.M .	48	-- 1982
82-	Lonsdale Universal	73	-- 1982
83-	Martonair International plc	24	Mar.1986
84-	Mallinson Denny	17	-- 1980
85-	Miller(F) (Textiles)	59	Feb.1984
86-	Moben Group	38	Sep.1984
87-	Muirhead	19	-- 1985
88-	Maynards plc	49	Sep.1985
89-	Marshall Cavendish Ltd	53	-- 1983
90-	Nss NewsAgents Plc.	58	Jun.1986
91-	Needlers	49	Nov.1985
92-	New Equipment Plc	38	Mar.1984

93- Noble & Lund	28	Aug.1985
94- Nottingham Manufacturing	59	Jun.1985
95- North(MF) Ltd.	47	Jun.1982
96- Owen Owen	55	Oct.1985
97- Paradise (B) Ltd.	59	Mar.1980
98- Pearce (C.H.) & Sons Plc.	18	Dec.1985
99-Planet Group Plc	41	May.1985
100-Phillips Patents (Hold.)	64	Oct.1985
101-Pauls Plc	49	Feb.1985
102-Panto (P)	58	Mar.1984
103-Paterson Jenks Plc	45	May.1984
104-Robert Adlar Plc	13	Jun.1986
105-Raybeck plc	59	Jun.1986
106-Robertson Foods Ltd	49	Feb.1981
107-Selincourt plc	59	Jun.1985
108-Sunbeam Wolsey plc	59	Jun.1986
109-Sharpe(Charles) & Co	76	Aug.1985
110-Stewart Plastics plc	66	Oct.1985
111-Sparrow (G.W.)& Sons	18	Dec.1985
112-Status Discount Ltd	*56*	*Mar.1980*
113-Shaw Carpets	*37*	*Mar.1986*
114-SGB Group	18	Apr.1986
115-Telefusion Plc.	36	Oct.1985
116-Trident Television plc	48	Jan.1985
117- Tecalemit	41	-- 1984
118 United Wire Group	26	Jun 1985

APPENDIX 2

An Example of DATASTREAM Programmes
Used to Collect the Financial Information

(A)

904154 BEN BAILEY CONSTR.

	30/ 6/81	30/ 6/82	30/ 6/83	30/ 6/84	30/ 6/85
701 RETURN ON S'HOLDERS EQUITY %	0.43	1.78	6.47	9.41	-1.77
707 RETURN ON CAPITAL EMPLOYED %	4.15	6.58	13.18	13.12	3.24
721 TURNOVER/ASSETS EMPLOYED	1.19	1.49	1.88	1.62	1.28
733 BORROWING RATIO	0.51	0.64	0.44	0.76	0.88
719 CASH FLOW MARGIN %	4.96	3.23	5.19	5.22	0.47
183 NET E.P.S. FULL TAX	0.17	0.73	2.84	4.61	0.00
301 ORDINAR SHARE CAPITAL	522	522	522	522	522
302 OTHER EQUITY CAPITAL	0	0	0	0	0
104 TOTAL SALES	3,773	5,207	6,199	7,344	5,955

DATASTREAM programme N0. 190X has been used. In this programme only six companies (represented by DATATSTREAM special code) can be filled in the sheet of information received from the service. Another vaital information to be filled in the sheet are the financial statement items (each allocated a special code e.g 701 or 391).

SECTORS
INDPLUK,MCHNDUK,ELTCAUK,ELTNCUK,PUMPSUK

INDUSTRIAL PLANT(INDPLUK)

	28/ 2/83	29/ 2/84	28/ 2/85	28/ 2/86
701 RETURN ON S'HOLDERS EQUITY %	5.77	6.48	4.68	9.91
707 RETURN ON CAPITAL EMPLOYED %	13.57	13.17	10.50	15.17
721 TURNOVER/ASSETS EMPLOYED	2.00	1.93	1.95	2.23
743 CASH/CURR. LIABILITIES	0.22	0.27	0.21	0.21

744	CASH & SEC /CURRENT LIABILIT'S	0.23	0.27	0.21	0.22
733	BORROWING RATIO	0.31	0.32	0.37	0.33
719	CASH FLOW MARGIN %	4.98	5.62	3.99	5.34

The same DATASTREAM programme N0. 190X has beeen used to get information about the industry average, each industry is represented by special DATASTREAM letters e.g. ELTCNUK= electronics U.K.

(B) PE for 905154 BEN BAILEY CONSTR

HIGH VALUE 16.28 31/12/85
LOW VALUE 11.40 31/12/82

FROM 31/12/82 TO 31/12/86

1982	11.40
1983	15.24
1984	12.51
1985	16.28
1986	15.45

DATASTREAM programme N0.401X has been used to get information about the P/E ratio and the market value .

APPENDIX 3

Financial Variables

Variables	Abbreviation
Profitability Measures	
- Return on capital employed	ROCER
- Return on Shareholders equity	ROSER
- Profit margin ratio	PMR
- Cash flow margin ratio	CFMR
- Earning Margin ratio	EMR
- Turnover ratio	TR
- Earnings per share	EPS
Gearing Measures	
- Capital gearing ratio	CGR
- Borrowing ratio	BR
Liquidity Measures	
- Cash over current liabilities	COCL
- Quick Assets ratio	QAR
- Cash and security over current liability	CSOCL
Growth Measure	
- Percentage change in sales	GRS
Size Measures	
- Book value of net assets	BVNASS
- Market value of common equity	MVCE
- Sales	Sales

Market valuation Measures

-Price earning ratio	P/E
-Market value of common equity/ Book value of common equity	MV/BV

Funds Flow Measures

- Funds generated from operation/sale	FGFO/Sales
- Funds generated from operation/Market value	FGFO/MV
- Funds generated from operation/Book value	FGFO/BV
- Total sources/Sales	TS/Sales
- Total sources/Market value	TS/MV
- Total sources/Book value	TS/BV
- Movement in liquid Funds/sales	MILF/Sales
- Movement in liquid Funds/Market value	MILF/MV
- Movement in liquid Funds/Book value	MILF/BV

Ratios definitions and calculations

Profitability Measures

$$1- \quad ROCER = \frac{\text{Pre-tax profits+interest charges}}{\text{Total capital employed+borrowing within 1 year - goodwill}}$$

- Interest charges=interest on short term loans + interest on long term loans+interest on convertibles + interest (leasing finance) - interest capitalised.

- Total capital employed= total share capital and reserves + total provisions + minority interests + total loan capital.

$$2- \quad ROSER = \frac{\text{Earned for ordinary (full tax)}}{\text{Ordinary share capital and reserves + deferred tax - goodwill}}$$

- Earned for ordinary =Net profit after tax + minority interest and preference dividends - Extraordinary items.

$$3-\quad PMR = \frac{\text{Pre-tax profits (Exc.Assocs.)}}{\text{Total Sales}}$$

- Pre-tax profit (Exc.Assocs.)= Operating profit + non trading income - interest charges.

$$4-\quad CFMR = \frac{\begin{array}{l}\text{Earned for ordinary + Depreciation}\\ \text{+ UK tax equalisation}\\ \text{+ Overseas tax equalisation}\\ \text{+ supplementary tax equalisation}\end{array}}{\text{Total Sales}}$$

- Depreciation: This represents the non-cash charges for obsolescence of ordinary wear and tear on property, plant and other equipment furnishing etc.

- UK tax equalisation: This reflects the effect of timing differences between reported income and expenses allowed for tax purposes. It is the provision for taxation which is likely to be payable in the foreseeable future. Tax deferred may be due to stock relief, the excess of capital allowances over depreciation provided during the period and other timing differences.

- Overseas tax equalisation: Overseas taxation deferred due to capital allowances.

- Tax equalisation (Supp) = Most UK companies follow SSAP15 on deferred tax. Consequently they are showing a tax charge which is usually less than under previous policies. To provide comparability a supplementary charge is entered here when applicable. The figure may be supplied in the company's account or derived from information required under SSAP15. The effect of this is to show the total tax charge on a fully taxed basis.

$$5-\quad EMR = \frac{\begin{array}{l}\text{Earned for ordinary (Full tax)}\\ \text{- associate retentions}\end{array}}{\text{Total Sales}}$$

- Associate retention= This is shown after excluding extraordinary items. Dividends received from associates may be obtained by deducting taxation and retention from

associates pre-tax.

$$6\text{-}\quad TR = \frac{\text{Total Sales}}{\text{Net fixed assets + total investment + other assets + net current assets + borrowings repayable within 1Year}}$$

- Total investment= Total investment +Total associates and other long term investment.

7- EPS= Earning per share are obtained by dividing earned for ordinary by the average weighted number of shares at the year end.

Gearing ratios

$$1\text{-}\quad CGR = \frac{\text{Preference capital + total loan capital +borrowing repayable within 1Year}}{\text{Total capital employed + borrowings repayable within 1 year - goodwill}}$$

- Total loan capital = Loans repayable within 5 years + Long term loans (loans, other than convertibles repayable in more than 5 years) + convertible loans+leasing finance (represents rentals due in respect of fixed assets leased.

$$2\text{-}\ BR\frac{\text{Total loan capital +borrowing repayable within 1 Year}}{\text{Total equity capital and reserves + deferred tax - goodwill}}$$

Liquidity ratios

$$1\text{-}\quad COCL = \frac{\text{Cash and equivalent}}{\text{Total current liabilities}}$$

- Total current liabilities = Current provisions + Total creditors and equivalent + Borrowing repayable within 1Year.

$$2-\quad QAR = \frac{\text{Total current assets - stock and work in progress}}{\text{Total current liabilities}}$$

$$3\quad CSOCL = \frac{\text{Total cash and equivalent +Quoted Investment at M.V}}{\text{total current liabilities}}$$

- Quoted investment=All investments in Government stock and other fixed interest securities +other quoted investments held by the company.

Growth Measures

1- GRS= Percentage change in total sales= $\frac{S_t - S_{1t-1}}{S_{t-1}}$

Size Measures

1- BVNASS =Net current assets + Net fixed assets.

2- MVCE =market Price per share x Number of shares

3- Sales =Domestic Sales + Exports + Overseas sale -(inter company sales+assocs sales+value added tax + other Duties and Taxes).

Market valuation measures

1- MVCE/BV = the ratio of market value of common equity over the book value of common equity at the end of the financial year.

2- P/E = the price per share over the earning per share at the end of the financial year.

Funds flow Measures

$$1-\quad FGFO/Sales = \frac{\text{Funds generated from operation}}{\text{sales}}$$

$$2-\quad FGFO/MV = \frac{\text{Funds generated from operation}}{\text{Market value of common equity}}$$

$$3-\quad FGFO/BV = \frac{\text{Funds generated from operation}}{\text{Book value of common equity}}$$

- Fund generated from operations= Pre-tax profit + depreciation + other adjustments (Those items included in pre-tax profit which do not involve the movement of funds).

$$4-\quad TS/Sales = \frac{\text{Total sources}}{\text{Sales}}$$

$$5-\quad TS/MV = \frac{\text{Total sources}}{\text{Market value of common equity}}$$

$$6-\quad TS/BV = \frac{\text{Total sources}}{\text{Book value of common equity}}$$

- Total sources = Funds generated from operation + funds raised by capital issues + funds raised from other sources (sales of fixed assets + Grants + Miscellaneous sources.

$$7-\quad MILF/Sales = \frac{\text{Movement in liquid funds}}{\text{Sales}}$$

$$8-\quad MILF/MV = \frac{\text{Movement in liquid funds}}{\text{Market value of common equity}}$$

$$9- \quad MILF/BV = \frac{\text{Movement in liquid funds}}{\text{Book value of common equity}}$$

Movement in liquid funds= Changes in cash and equivalent - borrowings repayable within 1 year.

APPENDIX 4

An SPSS command File to Calculate Ratios Averages and Other Variables

```
GET FILE= 'C:\MONA1\TEST6.SYS'.
COMPUTE MVAV1=(MVT1+MVT2)/2.
COMPUTE MVAV2=(MVT1+MVT2+MVT3)/3.
COMPUTE MVAV3=(MVT1+MVT2+MVT3+MVT4)/4.
COMPUTE MVAV4=(MVT1+MVT2+MVT3+MVT4+MVT5)/5.
COMPUTE PERAV1=(PERT1+PERT2)/2.
COMPUTE PERAV2=(PERT1+PERT2+PERT3)/3.
COMPUTE PERAV3=(PERT1+PERT2+PERT3+PERT4)/4.
COMPUTE PERAV4=(PERT1+PERT2+PERT3+PERT4+PERT5)/5.
COMPUTE GRAV1=(GRT1+GRT2)/2.
COMPUTE GRAV2=(GRT1+GRT2+GRT3)/3.
COMPUTE GRAV3=(GRT1+GRT2+GRT3+GRT4)/4.
COMPUTE GRAV4=(GRT1+GRT2+GRT4+GRT4+GRT5)/5.
COMPUTE ROSERA1=(ROSERT1+ROSERT2)/2.
COMPUTE ROSERA2=(ROSERT1+ROSERT2+ROSERT3)/3.
COMPUTE ROSERA3=(ROSERT1+ROSERT2+ROSERT3+ROSERT4)/4.
COMPUTE ROSERA4=(ROSERT1+ROSERT2+ROSERT3+ROSERT4+ROSERT5)/5.
COMPUTE ROCERA1=(ROCERT1+ROCERT2)/2.
COMPUTE ROCERA2=(ROCERT1+ROCERT2+ROCERT3)/3.
COMPUTE ROCERA3=(ROCERT1+ROCERT2+ROCERT3+ROCERT4)/4.
COMPUTE ROCERA4=(ROCERT1+ROCERT2+ROCERT3+ROCERT4+ROCERT5)/5.
COMPUTE TOAERA1=(TOAERT1+TOAERT2)/2.
COMPUTE TOAERA2=(TOAERT1+TOAERT2+TOAERT3)/3.
COMPUTE TOAERA3=(TOAERT1+TOAERT2+TOAERT3+TOAERT4)/4.
COMPUTE TOAERA4=(TOAERT1+TOAERT2+TOAERT3+TOAERT4+TOAERT5)/5.
COMPUTE COCLRA1=(COCLRT1+COCLRT2)/2.
COMPUTE COCLRA2=(COCLRT1+COCLRT2+COCLRT3)/3.
COMPUTE COCLRA3=(COCLRT1+COCLRT2+COCLRT3+COCLRT4)/4.
COMPUTE COCLRA4=(COCLRT1+COCLRT2+COCLRT3+COCLRT4+COCLRT5)/5.
COMPUTE CSOCLA1=(CSOCLRT1+CSOCLRT2)/2.
COMPUTE CSOCLA2=(CSOCLRT1+CSOCLRT2+CSOCLRT3)/3.
COMPUTE CSOCLA3=(CSOCLRT1+CSOCLRT3+CSOCLRT4)/4.
COMPUTE CSOCLA4=(CSOCLRT1+CSOCLRT2+CSOCLRT3+CSOCLRT4+
CSOCLRT5)/5.
COMPUTE BRRAV1=(BRRT1+BRRT2)/2.
COMPUTE BRRAV2=(BRRT1+BRRT2+BRRT3)/3.
COMPUTE BRRAV3=(BRRT1+BRRT2+BRRT3+BRRT4)/4.
COMPUTE BRRAV4=(BRRT1+BRRT2+BRRT3+BRRT4+BRRT5)/5.
COMPUTE CFMRAV1=(CFMRT1+CFMRT2)/2.
COMPUTE CFMRAV2=(CFMRT1+CFMRT2+CFMRT2+CFMRT3)/3.
COMPUTE CFMRAV3=(CFMRT1+CFMRT2+CFMRT3+CFMRT4)/4.
COMPUTE CFMRAV4=(CFMRT1+CFMRT2+CFMRT3+CFMRT4+CFMRT5)/5.
COMPUTE PMRAV1=(PMRT1+PMRT2)/2.
COMPUTE PMRAV2=(PMRT1+PMRT2+PMRT3)/3.
```

```
COMPUTE PMRAV3=(PMRT1+PMRT2+PMRT3+PMRT4)/4.
COMPUTE PMRAV4=(PMRT1+PMRT2+PMRT3+PMRT4+PMRT5)/5.
COMPUTE QARAV1=(QART1+QART2)/2.
COMPUTE QARAV2=(QART1+QART2+QART3)/3.
COMPUTE QARAV3=(QART1+QART2+QART3+QART4)/4.
COMPUTE QARAV4=(QART1+QART2+QART3+QART4+QART5)/5.
COMPUTE CGRAV1=(CGRT1+CGRT2)/2.
COMPUTE CGRAV2=(CGRT1+CGRT2+CGRT3)/3.
COMPUTE CGRAV3=(CGRT1+CGRT2+CGRT3+CGRT4)/4.
COMPUTE CGRAV4=(CGRT1+CGRT2+CGRT3+CGRT4+CGRT5)/5.
COMPUTE EPSAV1=(EPST1+EPST2)/2.
COMPUTE EPSAV2=(EPST1+EPST2+EPST3)/3.
COMPUTE EPSAV3=(EPST1+EPST2+EPST3+EPST4)/4.
COMPUTE EPSAV4=(EPST1+EPST2+EPST3+EPST4+EPST5)/5.

SAVE OUTFILE='C:\MONA1\TEST7.SYS'/ DROP= PERT2 PERT3
PERT4  PERT5  GRT2  GRT3  GRT4  GRT5  ROSERT2  ROSERT3
ROSERT4  ROSERT5  ROCERT2 ROCERT3 ROCERT4  ROCERT5  TOAERT2
TOAERT3  TOAERT4  TOAERT5 COCLRT2 COCLRT3  COCLRT4  COCLRT5
CSOCLRT2 CSOCLRT3 CSOCLRT4 CSOCLRT5 BRRT2 BRRT3 BRRT4 BRRT5
CFMRT2  CFMRT3 CFMRT4 CFMRT5 PMRT2 PMRT3 PMRT4 PMRT5  QART2
QART3 QART4 QART5 CGRT2 CGRT3 CGRT4 CGRT5 EPST2 EPST3 EPST4
EPST5.

GET FILE='C:\MONA1\TEST7.SYS'.
COMPUTE MVTOBV1=MVT1/BVCET1.
COMPUTE MVTOBV2=( (MVT1/BVCET1)+(MVT2/BVCET2) )/2.
COMPUTE MVTOBV3=( (MVT1/BVCET1)+(MVT2/BVCET2)+(MVT3/BVCET3)
)/3.
COMPUTE MVTOBV4=((MVT1/BVCET1)+(MVT2/BVCET2)+(MVT3/BVCET3)
+(MVT4/BVCET4))/4.
COMPUTE MVTOBV5=((MVT1/BVCET1)+(MVT2/BVCET2)+(MVT3/BVCET3)+
(MVT4/BVCET4) +(MVT5/BVCET5) )/5.
COMPUTE NASSET1=NCAT1+NFAT1.
COMPUTE NASSE2=( (NCAT1+NFAT1)+(NCAT2+NFAT2) )/2.
COMPUTE NASSE3=(  (NCAT1+NFAT1)+(NCAT2+NFAT2)+(NCAT3+NFAT3)
)/3.
COMPUTE NASSE4=((NCAT1+NFAT1)+(NCAT2+NFAT2)+(NCAT3+NFAT3)
+(NCAT4+NFAT4) )/4.
COMPUTE NASSE5=((NCAT1+NFAT1)+(NCAT2+NFAT2)+(NCAT3+NFAT3)+
(NCAT4+NFAT4)+(NCAT5+NFAT5) )/5.
COMPUTE FGFOASE1=FGFOT1/NASSET1.
COMPUTE FGFOASE2=(  (FGFOT1/NASSET1)+(FGFOT2/(NCAT2+NFAT2))
)/2.
COMPUTE FGFOASE3=( (FGFOT1/NASSET1)+(FGFOT2/(NCAT2+NFAT2))
+(FGFOT3/(NCAT3+NFAT3)) )/3.
COMPUTE FGFOASE4=( (FGFOT1/NASSET1)+(FGFOT2/(NCAT2+NFAT2))
+(FGFOT3/(NCAT3+NFAT3))+(FGFOT4/(NCAT4+NFAT4)) )/4.
COMPUTE FGFOASE5=( (FGFOT1/NASSET1)+(FGFOT2/(NCAT2+NFAT2))
+(FGFOT3/(NCAT3+NFAT3))+(FGFOT4/(NCAT4+NFAT4))+(FGFOT5/
(NCAT5+NFAT5)))/5.
COMPUTE FGFOS1=FGFOT1/SALET1.
COMPUTE FGFOS2=( (FGFOT1/SALET1)+(FGFOT2/SALET2) )/2.
```

```
COMPUTE FGFOS3=((FGFOT1/SALET1)+(FGFOT2/SALET2)+
(FGFOT3/SALET3) )/3.
COMPUTE FGFOS4=((FGFOT1/SALET1)+(FGFOT2/SALET2)+
(FGFOT3/SALET3)+(FGFOT4/SALET4) )/4.
COMPUTE FGFOS5=((FGFOT1/SALET1)+(FGFOT2/SALET2)+
(FGFOT3/SALET3)+(FGFOT4/SALET4)+(FGFOT5/SALET5)) /5.
COMPUTE FGFOMV1=FGFOT1/MVT1.
COMPUTE FGFOMV2=( (FGFOT1/MVT1)+(FGFOT2/MVT2) )/2.
COMPUTE FGFOMV3=( (FGFOT1/MVT1)+(FGFOT2/MVT2)+(FGFOT3/MVT3)
)/3.
COMPUTE FGFOMV4=( (FGFOT1/MVT1)+(FGFOT2/MVT2)+(FGFOT3/MVT3)
+(FGFOT4/MVT4) )/4.
COMPUTE FGFOMV5=((FGFOT1/MVT1)+(FGFOT2/MVT2)+(FGFOT3/MVT3)
+(FGFOT4/MVT4)+(FGFOT5/MVT5) )/5.
COMPUTE TSASE1=TST1/NASSET1.
COMPUTE TSASE2=( (TST1/NASSET1)/(TST2/(NCAT2+NFAT2)) )/2.
COMPUTE TSASE3=((TST1/NASSET1)+(TST2/(NCAT2+NFAT2))+
(TST3/(NCAT3+NFAT3)))/3.
COMPUTE TSASE4=((TST1/NASSET1)+(TST2/(NCAT2+NFAT2))+
(TST3/(NCAT3+NFAT3))+(TST4/(NCAT4+NFAT4)) )/4.
COMPUTE TSASE5=((TST1/NASSET1)+(TST2/(NCAT2+NFAT2))+
(TST3/(NCAT3+NFAT3))+(TST4/(NCAT4+NFAT4))+(TST5/
(NCAT5+NFAT5)) )/5.
COMPUTE TSS1=TST1/SALET1.
COMPUTE TSS2=( (TST1/SALET1)+(TST2/SALET2) )/2.
COMPUTE  TSS3=(    (TST1/SALET1)+(TST2/SALET2)+(TST3/SALET3)
)/3.
COMPUTE TSS4=((TST1/SALET1)+(TST2/SALET2)+(TST3/SALET3)+
(TST4/SALET4))/4.
COMPUTE TSS5=((TST1/SALET1)+(TST2/SALET2)+(TST3/SALET3)+
(TST4/SALET4)+(TST5/SALET5) )/5.
COMPUTE TSMV1=TST1/MVT1.
COMPUTE TSMV2=( (TST1/MVT1)+(TST2/MVT2) )/2.
COMPUTE TSMV3=( (TST1/MVT1)+(TST2/MVT2)+(TST3/MVT3) )/3.
COMPUTE TSMV4=( (TST1/MVT1)+(TST2/MVT2)+(TST3/MVT3)+
(TST4/MVT4) )/4.
COMPUTE TSMV5=((TST1/MVT1)+(TST2/MVT2)+(TST3/MVT3)+
(TST4/MVT4)+(TST5/MVT5) )/5.
COMPUTE MILASE1=MILFT1/NASSET1.
COMPUTE MILFASE2=(  (MILFT1/NASSET1)+(MILFT2/(NCAT2+NFAT2))
)/2.
COMPUTE MILFASE3=( (MILFT1/NASSET1)+(MILFT2/(NCAT2+NFAT2))
+(MILFT3/(NCAT3+NFAT3)) )/3.
COMPUTE MILFASE4=( (MILFT1/NASSET1)+(MILFT2/(NCAT2+NFAT2))
+(MILFT3/(NCAT3+NFAT3))+(MILFT4/(NCAT4+NFAT4)) )/4.
COMPUTE MILFASE5=( (MILFT1/NASSET1)+(MILFT2/(NCAT2+NFAT2))
+(MILFT3/(NCAT3+NFAT3))+(MILFT4/(NCAT4+NFAT4))+(MILFT5/
(NCAT5+NFAT5)))/5.
COMPUTE MILFS1=MILFT1/SALET1.
COMPUTE MILFS2=( (MILFT1/SALET1)+(MILFT2/SALET2) )/2.
COMPUTE MILFS3=((MILFT1/SALET1)+(MILFT2/SALET2)+
(MILFT3/SALET3) )/3.
COMPUTE MILFS4=((MILFT1/SALET1)+(MILFT2/SALET2)+
```

```
(MILFT3/SALET3)+(MILFT4/SALET4) )/4.
COMPUTE MILFS5=((MILFT1/SALET1)+(MILFT2/SALET2)+
(MILFT3/SALET3)+(MILFT4/SALET4)+(MILFT5/SALET5) )/5.
COMPUTE MILFMV1=MILFT1/MVT1.
COMPUTE MILFMV2=( (MILFT1/MVT1)+(MILFT2/MVT2) )/2.
COMPUTE MILFMV3=( (MILFT1/MVT1)+(MILFT2/MVT2)+
(MILFT3/MVT3))/3.
COMPUTE MILFMV4=((MILFT1/MVT1)+(MILFT2/MVT2)+(MILFT3/MVT3)+
(MILFT4/MVT4))/4.
COMPUTE MILFMV5=((MILFT1/MVT1)+(MILFT2/MVT2)+(MILFT3/MVT3)+
(MILFT4/MVT4)+(MILFT5/MVT5) )/5.
COMPUTE SALETAV1=(SALET1+SALET2)/2.
COMPUTE SALETAV2=(SALET1+SALET2+SALET3)/3.
COMPUTE SALETAV3=(SALET1+SALET2+SALET3+SALET4)/4.
COMPUTE SALETAV4=(SALET1+SALET2+SALET3+SALET4+SALET5)/5.

SAVE OUTFILE='C:\MONA1\TEST8.SYS' DROP=BVCET1 BVCET2
BVCET3  BVCET4 BVCET5 NCAT1 NCAT2 NCAT3 NCAT4  NCAT5  NFAT1
NFAT2 NFAT3 NFAT4 NFAT5 FGFOT1 FGFOT2 FGFOT3 FGFOT4  FGFOT5
TST1 TST2 TST3 TST4 TST5 MILFT1 MILFT2 MILFT3 MILFT4
MILFT5  SALET2 SALET3 SALET4 SALET5 MVT2 MVT3 MVT4 MVT5.
```

APPENDIX 5

Pascal progmme used to clean the output files like the one presented in appendix 2

```
program dscopy;
var
  Namefile, Newfile  : text;
  Temp               : char;
  Dsfile, Dsnew      : string;
  begin
      writeln ('ENTER NAME OF INPUT FILE');
      readln (Dsfile);
      assign (Namefile, Dsfile);
      reset (Namefile);
      writeln ('ENTER NAME OF FILE FOR OUTPUT');
      Readln (Dsnew);
      assign (Newfile, Dsnew);
      rewrite (Newfile);
      repeat
      read (Namefile,Temp);
   if ((ord(Temp) < 123)) and ((ord(Temp) > 31)) then
      begin
      write (Newfile,Temp);
      write(Temp);
      end
      else
       begin
       if (ord(Temp) = 13) then
         begin
         writeln (Newfile, Temp);
         writeln (Temp);
         repeat
               read (Namefile, Temp)
  until (ord(Temp)<123) and (ord(Temp)>31) or eof(Namefile);
  if (ord(Temp)<123) and (ord(Temp)>31) then
            begin
            write(Newfile,Temp);
            write (Temp);
            end;
         end;
       end
  until eof (Namefile);
  close (Newfile);
end.
```

This is supplied by Dr. M.J. Nisbet

APPENDIX 6

Examples of Command Files Used to Carry Out the Final Analysis

(A)

```
DATA LIST FILE='C:\MONA1\RT.DAT'
/CODE 1-5 ROSERt5 11-18 (2) ROSERt4 20-27 (2) ROSERt3 29-36
(2)
 ROSERt2 38-45 (2)  ROSERt1 47-54 (2)
/ROCERt5  11-18  (2) ROCERt4 20-27 (2)  ROCERt3  29-36  (2)
ROCERt2 38-45 (2)
 ROCERt1 47-54 (2)
/TOAERt5  11-18  (2) TOAERt4 20-27 (2)  TOAERt3  29-36  (2)
TOAERt2 38-45 (2) TOAERt1 47-54 (2)
/COCLRt5  11-18  (2) COCLRt4 20-27 (2)  COCLRt3  29-36  (2)
COCLRt2 38-45 (2) COCLRt1 47-54 (2)
/CSOCLRt5  11-18 (2) CSOCLRt4 20-27 (2) CSOCLRt3 29-36  (2)
CSOCLRt2 38-45 (2) CSOCLRt1 47-54 (2)
/BRRt5 11-18 (2) BRRt4 20-27 (2) BRRt3 29-36 (2) BRRt2  38-
45 (2) BRRt1 47-54 (2)
/CFMRt5 11-18 (2) CFMRt4 20-27 (2) CFMRt3 29-36 (2)  CFMRt2
38-45 (2) CFMRt1 47-54 (2)
/EPSt5 11-18 (2) EPSt4 20-27 (2) EPSt3 29-36 (2) EPSt2  38-
45 (2) EPSt1 47-54 (2)/BVCEt5 11-18 BVCEt4 20-27 BVCEt3 29-
36 BVCEt2 38-45 BVCEt1 47-54
/SALEt5 11-18 SALEt4 20-27 SALEt3 29-36 SALEt2 38-45 SALEt1
47-54
/TCEt5 11-18 TCEt4 20-27 TCEt3 29-36 TCEt2 38-45 TCEt1  47-
54/NCAt5  11-18 NCAt4 20-27 NCAt3 29-36 NCAt2  38-45  NCAt1
47-54
/NFAt5 11-18 NFAt4 20-27 NFAt3 29-36 NFAt2 38-45 NFAt1  47-
54
/EMRt5 11-18 (2) EMRt4 20-27 (2) EMRt3 29-36 (2) EMRt2  38-
45 (2) EMRt1 47-54 (2)
/PMRt5 11-18 (2) PMRt4 20-27 (2) PMRt3 29-36 (2) PMRt2  38-
45 (2) PMRt1 47-54 (2)
/QARt5 11-18 (2) QARt4 20-27 (2) QARt3 29-36 (2) QARt2  38-
45 (2) QARt1 47-54 (2)
/FGFOt5 11-18 FGFOt4 20-27 FGFOt3 29-36 FGFOt2 38-45 FGFOt1
47-54
/TSt5 11-18 TSt4 20-27 TSt3 29-36 TSt2 38-45 TSt1 47-54
/MILFt5 11-18 MILFt4 20-27 MILFt3 29-36 MILFt2 38-45 MILFt1
47-54
/CGRt5  11-18 (2) CGRt4 20-27 (2) CGRt3 29-36 (2) CGRt2 38-
45 (2) CGRt1 47-54 (2).
```

```
VARIABLE LABELS ROSERt5 'RET SEQU -5YRS'
/ROSERt4 'RET SEQU -4YRS'
/ROSERt3 'RET SEQU -3YRS'
/ROCERt2 'RET SEQU -2YRS'
/ROSERt1 'RET SEQU -1YR'
/ROCERt5 'RET CAPITAL -5YRS'
/ROCERt4 'RET CAPITAL -4YRS'
/ROCERt3 'RET CAPITAL -3YRS'
/ROCERt2 'RET CAPITAL -2YRS'
/ROCERt1 'RET CAPITAL -1YR'
/TOAERt5 'TOVER TO ASSETS -5YRS'
/TOAERt4 'TOVER TO ASSETS -4YRS'
/TOAERt3 'TOVER TO ASSETS -3YRS'
/TOAERt2 'TOVER TO ASSETS -2YRS'
/TOAERt1 'TOVER TO ASSETS -1YR'
/COCLRt5 'CASH TO CURR LIAB -5YRS'
/COCLRt4 'CASH TO CURR LIAB -4YRS'
/COCLRt3 'CASH TO CURR LIAB -3YRS'
/COCLRt2 'CASH TO CURR LIAB -2YRS'
/COCLRt1 'CASH TO CURR LIAB -1YR'
/CSOCLRt5 'CASH & SC TO CURR LIAB -5YRS'
/CSOCLRt4 'CASH & SC TO CURR LIAB -4YRS'
/CSOCLRt3 'CASH & SC TO CURR LIAB -3YRS'
/CSOCLRt2 'CASH & SC TO CURR LIAB -2YRS'
/CSOCLRt1 'CASH & SC TO CURR LIAB -1YR'
/BRRt5 'BORROWING RATIO -5YRS'
/BRRt4 'BORROWING RATIO -4YRS'
/BRRt3 'BORROWING RATIO -3YRS'
/BRRt2 'BORROWING RATIO -2YRS'
/BRRt1 'BORROWING RATIO -1YR'
/CFMRt5 'CASH FLOW MARGIN -5YRS'
/CFMRt4 'CASH FLOW MARGIN -4YRS'
/CFMRt3 'CASH FLOW MARGIN -3YRS'
/CFMRt2 'CASH FLOW MARGIN -2YRS'
/CFMRt1 'CASH FLOW MARGIN -1YR'
/EPSt5 'EARNING PER SHARE -5YRS'
/EPSt4 'EARNING PER SHARE -4YRS'
/EPSt3 'EARNING PER SHARE -3YRS'
/EPSt2 'EARNING PER SHARE -2YRS'
/EPSt1 'EARNING PER SHARE -1YR'
/BVCEt5 'BOOK VALUE COM EQUITY -5YRS'
/BVCEt4 'BOOK VALUE COM EQUITY -4YRS'
/BVCEt3 'BOOK VALUE COM EQUITY -3YRS'
/BVCEt2 'BOOK VALUE COM EQUITY -2YRS'
/BVCEt1 'BOOK VALUE COM EQUITY -1YR'
/SALEt5 'TOTAL SALES -5YRS'
/SALEt4 'TOTAL SALES -4YRS'
/SALEt3 'TOTAL SALES -3YRS'
/SALEt2 'TOTAL SALES -2YRS'
/SALEt1 'TOTAL SALES -1YR'
/TCEt5 'TOTAL CAPITAL EMPLOYED -5YRS'
/TCEt4 'TOTAL CAPITAL EMPLOYED -4YRS'
/TCEt3 'TOTAL CAPITAL EMPLOYED -3YRS'
/TCEt2 'TOTAL CAPITAL EMPLOYED -2YRS'
```

```
/TCEt1 'TOTAL CAPITAL EMPLOYED -1YR'
/NCAt5 'NET CURRENT ASSETS -5YRS'
/NCAt4 'NET CURRENT ASSETS -4YRS'
/NCAt3 'NET CURRENT ASSETS -3YRS'
/NCAt2 'NET CURRENT ASSETS -2YRS'
/NCAt1 'NET CURRENT ASSETS -1YR'
/NFAt5 'NET FIXED ASSETS -5YRS'
/NFAt4 'NET FIXED ASSETS -4YRS'
/NFAt3 'NET FIXED ASSTS -3YRS'
/NFAt2 'NET FIXED ASSETS -2YRS'
/NFAt1 'NET FIXED ASSTS -1YR'
/EMRt5 'EARNING MARGIN -5YRS'
/EMRt4 'EARNING MARGIN -4YRS'
/EMRt3 'EARNING MARGIN -3YRS'
/EMRt2 'EARNING MARGIN -2YRS'
/EMRt1 'EARNING MARGIN -1YR'
/PMRt5 'PROFIT MARGIN -5YRS'
/PMRt4 'PROFIT MARGIN -4YRS'
/PMRt3 'PROFIT MARGIN -3YRS'
/PMRt2 'PROFIT MARGIN -2YRS'
/PMRt1 'PROFIT MATGIN -1YR'
/QARt5 'QUICK ASSET RATIO -5YRS'
/QARt4 'QUICK ASSET RATIO -4YRS'
/QARt3 'QUICK ASSET RATIO -3YRS'
/QARt2 'QUICK ASSET RATIO -2YRS'
/QARt1 'QUICK ASSET RATIO -1YR'
/FGFOt5 'FUNDS FROM OPERATIONS -5YRS'
/FGFOt4 'FUNDS FROM OPERATIONS -4YRS'
/FGFOt3 'FUNDS FROM OPERATIONS -3YRS'
/FGFOt2 'FUNDS FROM OPERATIONS -2YRS'
/FGFOt1 'FUNDS FROM OPERATIONS -1YR'
/TSt5 'TOTAL SOURCES -5YRS'
/TSt4 'TOTAL SOURCES -4YRS'
/TSt3 'TOTAL SOURCES -3YRS'
/TSt2 'TOTAL SOURCES -2YRS'
/TSt1 'TOTAL SOURCES -1YR'
/MILFt5 'NET MOV LIQUID FUNDS -5YRS'
/MILFt4 'NET MOV LIQUID FUNDS -4YRS'
/MILFt3 'NET MOV LIQUID FUNS -3YRS'
/MILFt2 'NET MOV LIQUID FUNDS -2YRS'
/MILFt1 'NET MOV LIQUID FUNDS -1YR'
/CGRt5 'CAPITAL GEARING -5YRS'
/CGRt4 'CAPITAL GEARING -4YRS'
/CGRt3 'CAPITAL GEARING -3YRS'
/CGRt2 'CAPITAL GEARING -2YRS'
/CGRt1 'CAPITAL GEARING -1YR'.

VALUE LABELS ROSERt1 ROSERt2 ROSERt3 ROSERt4 ROSERt5
ROCERt1  ROCERt2  ROCERt3 ROCERt4 ROCERt5  TOAERt1  TOAERt2
TOAERt3  TOAERt4  TOAERt5 COCLRt1 COCLRt2  COCLRt3  COCLRt4
COCLRt5 CSOCLRt1 CSOCLRt2 CSOCLRt3 CSOCLRt4 CSOCLRt5  BRRt1
BRRt2 BRRt3 BRRt4 BRRt5 CFMRt1 CFMRt2 CFMRt3 CFMRt4  CFMRt5
EPSt1 EPSt2 EPSt3 EPSt4 EPSt5 EMRt1 EMRt2 EMRt3 EMRt4 EMRt5
PMRt1 PMRt2 PMRt3 PMRt4 PMRt5 QARt1 QARt2 QARt3 QARt4 QARt5
```

```
CGRt1 CGRt2 CGRt3 CGRt4 CGRt5
/BVCEt1 BVCEt2 BVCEt3 BVCEt4 BVCEt5
SALEt1 SALEt2 SALEt3 SALEt4 SALEt5 TCEt1 TCEt2 TCEt3  TCEt4
TCEt5 NCAt1 NCAt2 NCAt3 NCAt4 NCAt5 NFAt1 NFAt2 NFAt3 NFAt4
NFAt5  FGFOt1  FGFOt2 FGFOt3 FGFOt4 FGFOt5 TSt1  TSt2  TSt3
TSt4 TSt5 MILFt1 MILFt2 MILFt3 MILFt4 MILFt5.

SAVE OUTFILE 'C:\MONA1\RTOUT.SYS'.
```

This is the main command file used to arrange the raw data for SPSS package. Many other command files have been used.

B (An SPSS commande file to carry out the univariate analysis)

```
GET FILE='C:\MONA1\DELV.SYS'.
SET LISTING='C:\MONA1\MKH1.TS8'/ HISTOGRAM 'X'.
PROCESS IF ( TC = 1).
FREQUENCIES  A MVAV1 MVAV2 MVAV3 MVAV4 PERT1 PERAV1  PERAV2
PERAV3 PERAV4 GRT1 GRAV1 GRAV2 GRAV3 GRAV4 ROSERT1  ROSERA1
ROSERA2  ROSERA3  ROSERA4 ROCERT1 ROCERA1  ROCERA2  ROCERA3
ROCERA4  TOAERT1  TOAERA1 TOAERA2 TOAERA3  TOAERA4  COCLRT1
COCLRA1 COCLRA2 COCLRA3 COCLRA4 CSOCLRT1 CSOCLA1 CSOCLA2
CSOCLA3  CSOCLA4 BRRT1 BRRAV1 BRRAV2 BRRAV3  BRRAV4  CFMRT1
CFMRAV1 CFMRAV2 CFMRAV3 CFMRAV4 PMRT1 PMRAV1 PMRAV2  PMRAV3
PMRAV4  QART1  QARAV1  QARAV2 QARAV3  QARAV4  CGRT1  CGRAV1
CGRAV2 CGRAV3 CGRAV4
/FORMAT NOTABLE
/HISTOGRAM NORMAL
/STATISTICS MEAN STDDEV MAX MIN KURTOSIS SKEWNESS.
```

APPENDIX 7

Ratios Distribution Charts

PERT1 P/E RATIO -1YR

Count	Midpoint
22	6
47	14
22	22
7	30
2	38
1	46
0	54
9	62
0	70
0	78
0	86
0	94
1	102
0	110
0	118
6	126
1	134

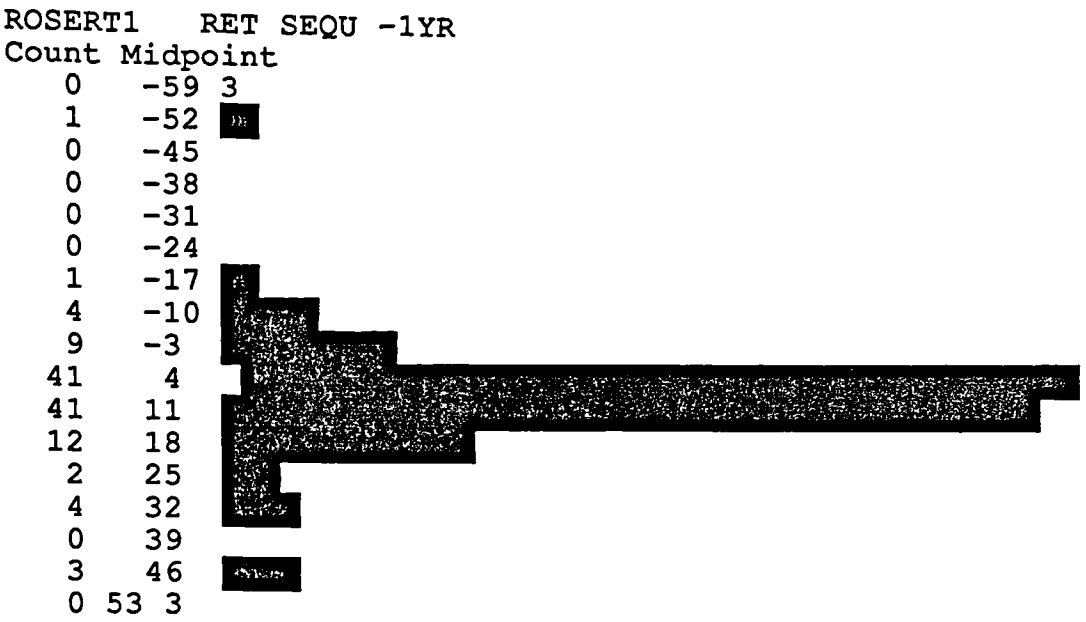
Mean 17.655 Std Dev 14.760

GRT1 GROWTH -1YR

Count	Midpoint
2	-36
2	-22
21	-8
52	6
25	20
9	34
3	48
1	62
0	76
0	90
0	104
1	118
0	132
0	146
0	160
0	174
2	188

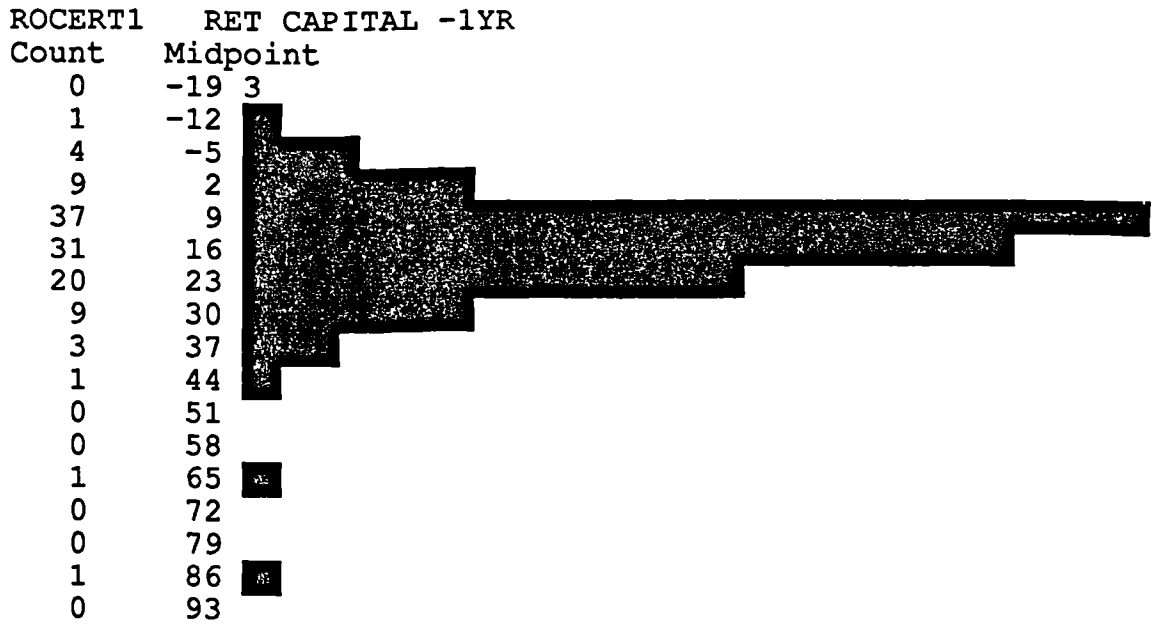
Mean 11.638 Std Dev 24.770

ROSERT1 RET SEQU -1YR



ROSERT1 RET SEQU -1YR
Mean 8.447 Std Dev 11.947

ROCERT1 RET CAPITAL -1YR



ROCERT1 RET CAPITAL -1YR
Mean 15.899 Std Dev 12.803

TOAERT1 TOVER TO ASSETS -1YR

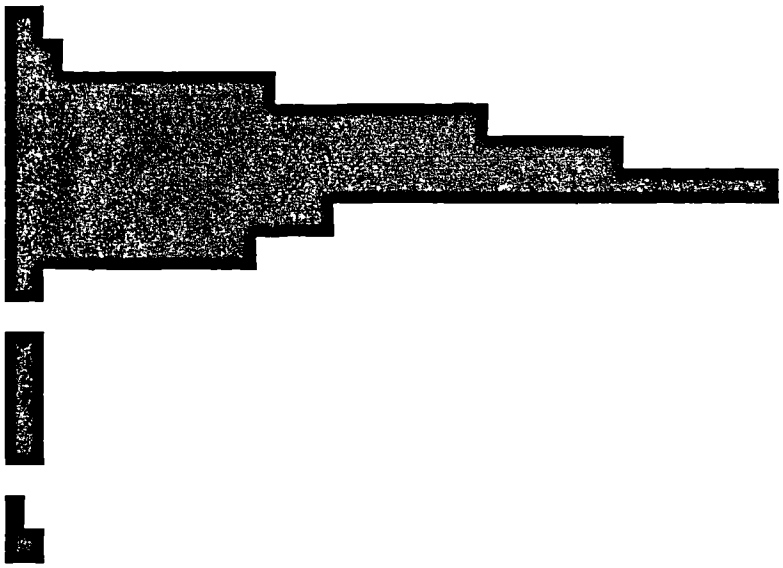
Count	Midpoint
1	0
20	1
39	2
23	3
16	4
7	5
3	6
1	7
2	8
0	9
0	10
0	11
3	12
1	13
1	14
1	15
0	16

TOAERT1 TOVER TO ASSETS -1YR

Mean 3.141 Std Dev 2.638

EMRT1 EARNING MARGIN -1YR

Count	Midpoint
1	-4.5
2	-3.0
8	-1.5
20	.0
26	1.5
31	3.0
13	4.5
10	6.0
1	7.5
0	9.0
1	10.5
1	12.0
1	13.5
1	15.0
0	16.5
1	18.0
1	19.5



EMRT1 EARNING MARGIN -1YR

Mean 2.656 Std Dev 3.284

COCLRT1 CASH TO CURR LIAB -1YR

Count	Midpoint	
43	.0	
41	.1	
15	.2	
6	.3	
1	.4	
4	.5	
1	.6	
1	.9	
0	1.0	
2	1.1	
0	1.2	
0	1.3	
2	1.4	
1	1.5	
1	1.6	

COCLRT1 CASH TO CURR LIAB -1YR

Mean .174 Std Dev .295

CSOCLRT1 CASH & SC TO CURR LIAB -1YR

Count	Midpoint	
0	-.10	
69	.05	
25	.20	
5	.35	
3	.50	
2	.65	
2	.80	
1	.95	
2	1.10	
0	1.25	
3	1.40	
1	1.55	
2	1.70	
0	1.85	
2	2.00	
1	2.15	
0	2.30	

CSOCLRT1 CASH & SC TO CURR LIAB -1YR

Mean .232 Std Dev .423

BRRT1 BORROWING RATIO -1YR

Count	Midpoint
0	-.25
30	.00
35	.25
24	.50
14	.75
7	1.00
0	1.25
3	1.50
1	1.75
1	2.00
0	2.25
0	2.50
1	2.75
0	3.00
0	3.25
2	3.50
0	3.75

BRRT1 BORROWING RATIO -1YR

Mean .478 Std Dev .596

CFMRT1 CASH FLOW MARGIN -1YR

Count	Midpoint
1	-2.5
9	.0
25	2.5
34	5.0
21	7.5
13	10.0
6	12.5
0	15.0
0	17.5
3	20.0
1	22.5
0	25.0
2	27.5
0	30.0
1	32.5
0	35.0
2	37.5

CFMRT1 CASH FLOW MARGIN -1YR

Mean 6.431 Std Dev 5.440

PMRT1 PROFIT MATGIN -1YR

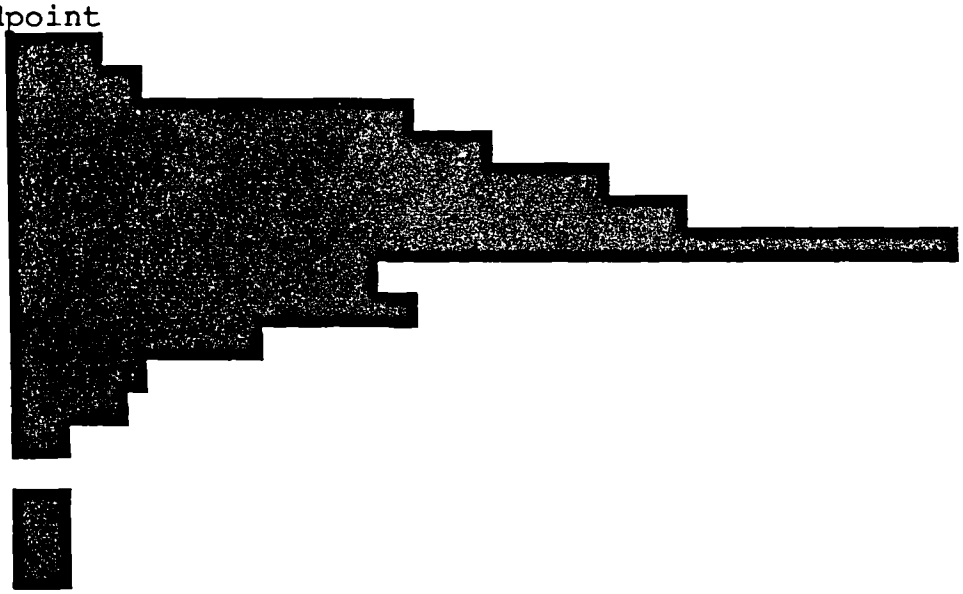
Count	Midpoint
0	-10
1	-7
1	-4
14	-1
36	2
31	5
16	8
10	11
3	14
1	17
0	20
0	23
2	26
1	29
0	32
2	35
0	38

PMRT1 PROFIT MATGIN -1YR

Mean 5.348 Std Dev 6.155

QART1 QUICK ASSET RATIO -1YR

Count	Midpoint
2	.00
3	.15
10	.30
12	.45
15	.60
17	.75
24	.90
9	1.05
10	1.20
6	1.35
3	1.50
3	1.65
1	1.80
0	1.95
1	2.10
1	2.25
1	2.40



QART1 QUICK ASSET RATIO -1YR

Mean .852 Std Dev .420

CGRT1 CAPITAL GEARING -1YR

Count	Midpoint
13	-1
8	4
4	9
10	14
14	19
13	24
10	29
12	34
8	39
11	44
7	49
2	54
1	59
1	64
1	69
2	74
1	79

CGRT1 CAPITAL GEARING -1YR

Mean 26.727 Std Dev 18.199

.

EPST1 EARNING PER SHARE -1YR

Count	Midpoint
32	1
20	4
21	7
14	10
13	13
4	16
4	19
3	22
1	25
2	28
0	31
2	34
0	37
0	40
1	43
0	46
1	49

EPST1 EARNING PER SHARE -1YR

Mean 8.411 Std Dev 8.788

MVTOBV1

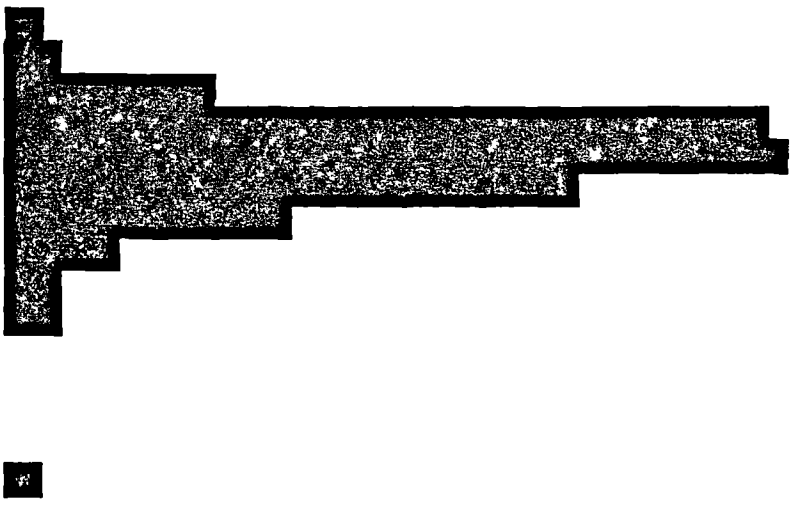
Count	Midpoint
27	0
57	5
16	10
7	15
2	20
1	25
3	30
1	35
1	40
0	45
1	50
0	55
1	60
0	65
0	70
0	75
1	80

MVTOBV1

Mean 7.667 Std Dev 10.673

FGFOASE1

Count	Midpoint
0	-.3
1	-.2
2	-.1
8	-.0
31	.1
32	.2
24	.3
11	.4
4	.5
2	.6
2	.7
0	.8
0	.9
0	1.0
0	1.1
1	1.2
0	1.3

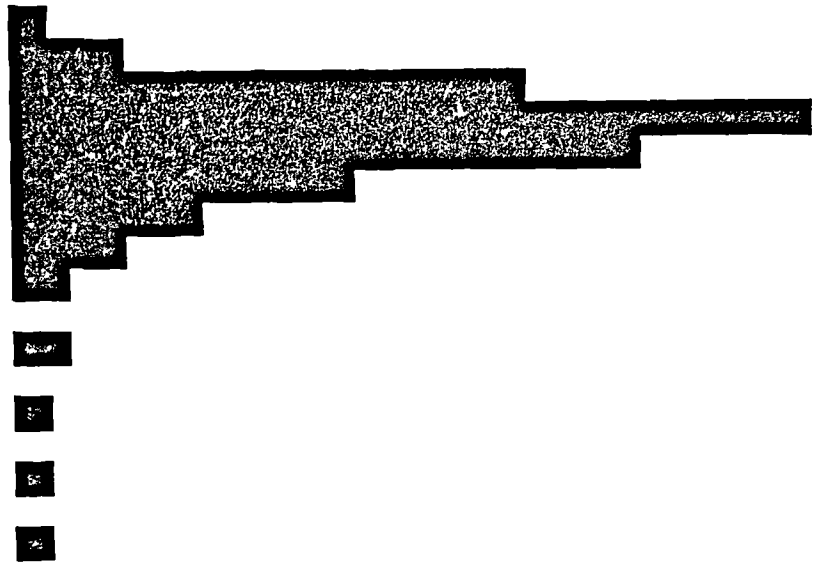


FGFOASE1

Mean .229 Std Dev .176

FGFOS1

Count	Midpoint
2	-.04
4	-.01
21	.02
33	.05
26	.08
14	.11
7	.14
4	.17
2	.20
0	.23
2	.26
0	.29
1	.32
0	.35
1	.38
0	.41
1	.44

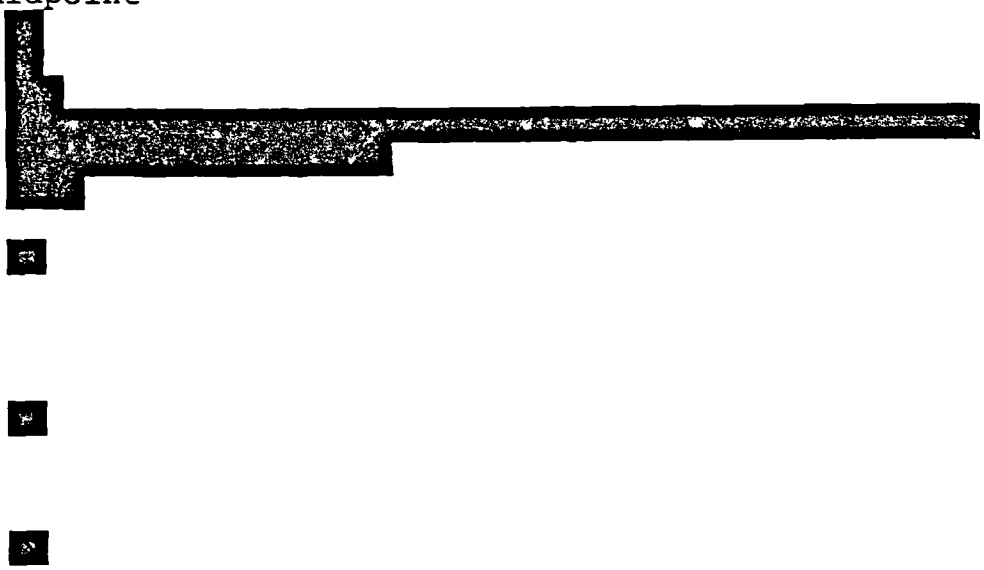


FGFOS1

Mean .079 Std Dev .072

FGFOMV1

Count	Midpoint
1	-.60
1	-.35
3	-.10
76	.15
29	.40
4	.65
0	.90
1	1.15
0	1.40
0	1.65
0	1.90
0	2.15
2	2.40
0	2.65
0	2.90
0	3.15
1	3.40

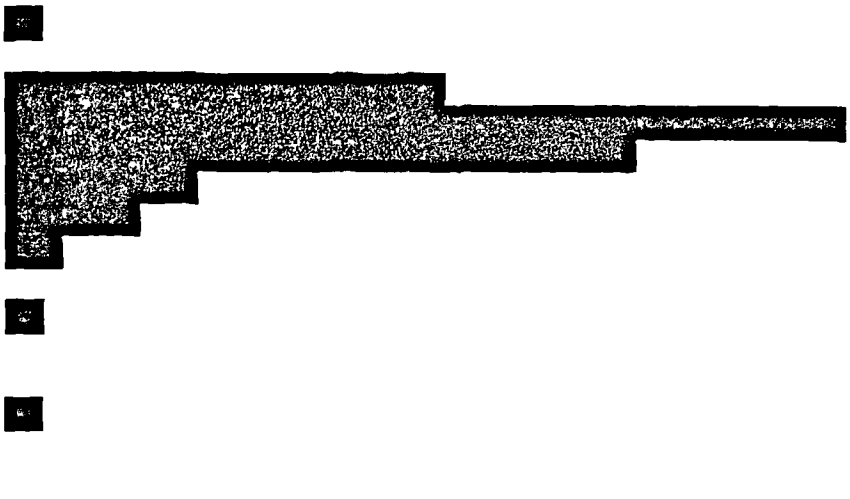


FGFOMV1

Mean .282 Std Dev .414

TSASE1

Count	Midpoint	
0	-.55	
0	-.40	
1	-.25	
0	-.10	
22	.05	
43	.20	
31	.35	
9	.50	
6	.65	
3	.80	
1	.95	
1	1.10	
0	1.25	
0	1.40	
1	1.55	
0	1.70	
0	1.85	

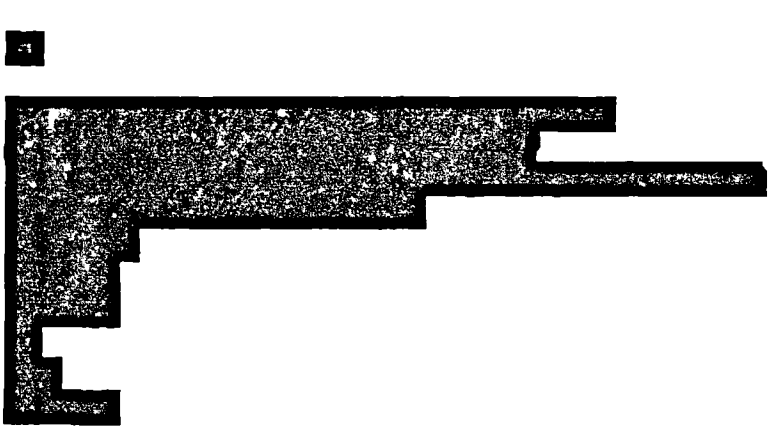


TSASE1

Mean .292 Std Dev .236

TSS1

Count	Midpoint	
0	-.11	
1	-.07	
0	-.03	
25	.01	
22	.05	
31	.09	
17	.13	
5	.17	
4	.21	
4	.25	
1	.29	
2	.33	
4	.37	
0	.41	
0	.45	
1	.49	
0	.53	



TSS1

Mean .102 Std Dev .095

TSMV1

Count	Midpoint
2	-.797
0	-.464
6	-.131
72	.202
27	.535
7	.868
1	1.201
0	1.534
0	1.867
1	2.200
0	2.533
0	2.866
0	3.199
1	3.532
0	3.865
0	4.198
1	4.531

TSMV1

Mean .387 Std Dev .573

MILASE1

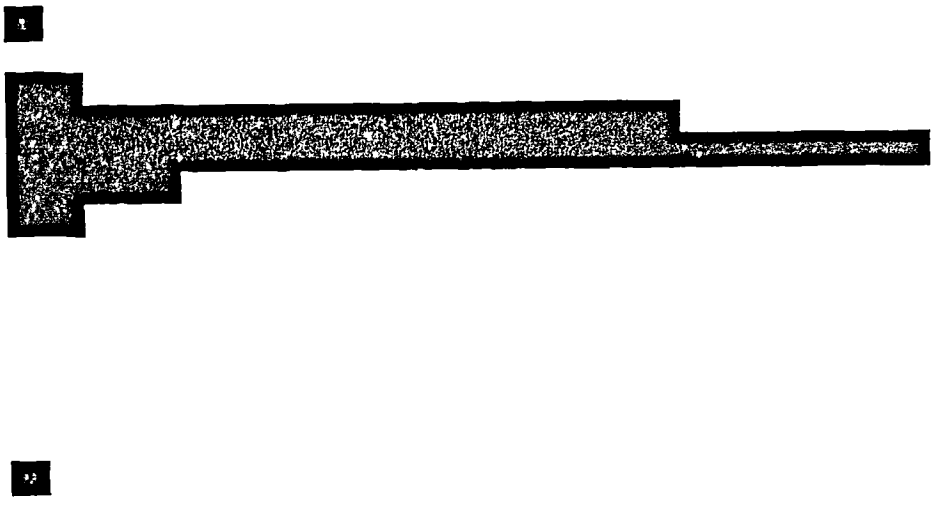
Count	Midpoint
0	-1.15
2	-1.00
0	-.85
0	-.70
2	-.55
4	-.40
8	-.25
37	-.10
42	.05
13	.20
7	.35
1	.50
1	.65
0	.80
0	.95
1	1.10
0	1.25

MILASE1

Mean -.001 Std Dev .238

MILFS1

Count	Midpoint
0	-.350
2	-.275
0	-.200
4	-.125
41	-.050
56	.025
10	.100
4	.175
0	.250
0	.325
0	.400
0	.475
0	.550
0	.625
0	.700
1	.775
0	.850



MILFS1

Mean .009 Std Dev .095

MILFMV1

Count	Midpoint
0	-.9
3	-.7
3	-.5
7	-.3
49	-.1
33	.1
12	.3
5	.5
2	.7
0	.9
0	1.1
1	1.3
1	1.5
0	1.7
0	1.9
1	2.1
0	2.3

MILFMV1

Mean .057 Std Dev .346

SALET1 TOTAL SALES -1YR

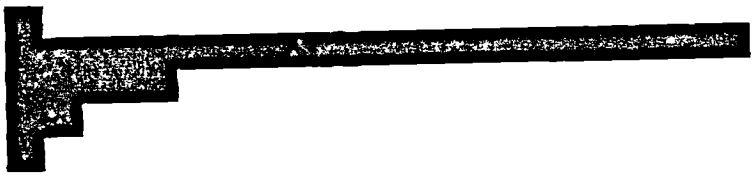
Count	Midpoint
76	34008
14	97341
7	160674
5	224007
5	287340
4	350673
1	414006
0	477339
2	540672
0	604005
0	667338
0	730671
0	794004
2	857337
0	920670
0	984003
1	1047336

SALET1 TOTAL SALES -1YR

Mean 107537.513 Std Dev 174300.628

PERT1 P/E RATIO -1YR

Count	Midpoint
4	0
152	13
30	26
10	39
5	52
4	65
0	78
1	91
0	104
1	117
1	130
0	143
0	156
0	169
0	182
0	195
1	208



PERT1 P/E RATIO -1YR

Mean 20.008 Std Dev 20.747

GRT1 Count	GROWTH -1YR Midpoint
2	-56
4	-30
100	-4
100	22
10	48
3	74
2	100
0	126
0	152
1	178
0	204
0	230
0	256
1	282
0	308
0	334
1	360

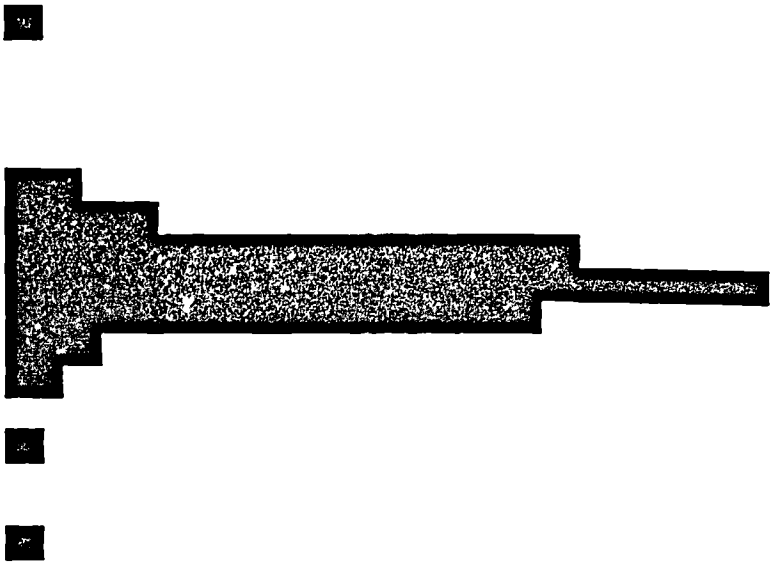
GRT1	GROWTH -1YR		
Mean	15.747	Std Dev	36.707

ROSERT1 Count	RET SEQU -1YR Midpoint
1	-123
0	-108
0	-93
0	-78
0	-63
1	-48
2	-33
6	-18
32	-3
154	12
20	27
3	42
2	57
0	72
0	87
1	102
1	117

ROSERT1	RET SEQU -1YR		
Mean	10.607	Std Dev	16.874

ROCERT1 RET CAPITAL -1YR

Count	Midpoint	
1	-47	
0	-39	
0	-31	
0	-23	
2	-15	
6	-7	
13	1	
70	9	
75	17	
40	25	
10	33	
4	41	
2	49	
2	57	
0	65	
0	73	
1	81	

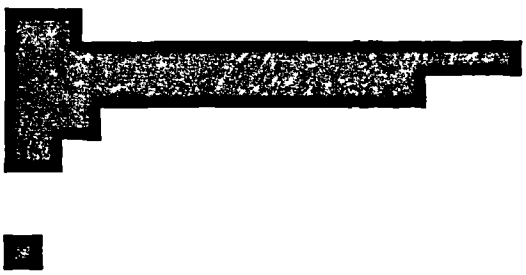


ROCERT1 RET CAPITAL -1YR

Mean 15.992 Std Dev 11.913

TOAERT1 TOVER TO ASSETS -1YR

Count	Midpoint	
0	-3.0	
0	-1.5	
10	.0	
100	1.5	
81	3.0	
16	4.5	
9	6.0	
3	7.5	
1	9.0	
2	10.5	
0	12.0	
1	13.5	
0	15.0	
0	16.5	
1	18.0	
0	19.5	
0	21.0	



TOAERT1 TOVER TO ASSETS -1YR

Mean 2.674 Std Dev 2.038

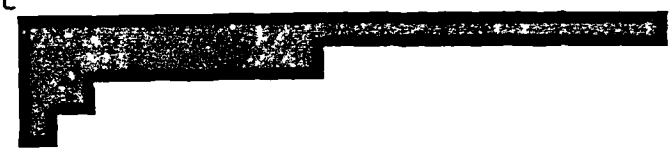
EMRT1 EARNING MARGIN -1YR

Count	Midpoint	
1	-260	▌
0	-243	
0	-226	
0	-209	
0	-192	
0	-175	
0	-158	
0	-141	
0	-124	
0	-107	
0	-90	
0	-73	
1	-56	▌
0	-39	
0	-22	
112	-5	
110	12	

EMRT1 EARNING MARGIN -1YR

Mean 2.470 Std Dev 18.130

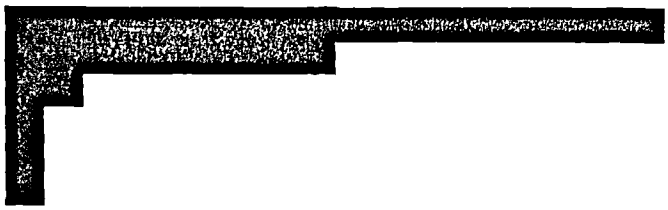
COCLRT1 CASH TO CURR LIAB -1YR

Count	Midpoint	
141	.0	
64	.4	
10	.8	
3	1.2	
3	1.6	
1	2.0	
1	2.4	
1	2.8	
0	3.2	
0	3.6	
0	4.0	
0	4.4	
0	4.8	
0	5.2	
0	5.6	
0	6.0	
0	6.4	

COCLRT1 CASH TO CURR LIAB -1YR

Mean .262 Std Dev .554

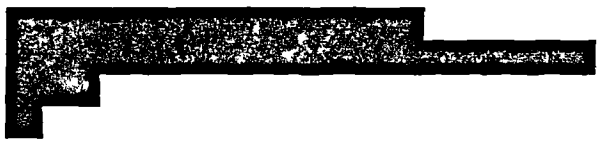
CSOCLRT1 CASH & SC TO CURR LIAB -1YR

Count	Midpoint	
140	.0	
60	.4	
12	.8	
3	1.2	
4	1.6	
2	2.0	
1	2.4	
0	2.8	
2	3.2	
0	3.6	
0	4.0	
0	4.4	
0	4.8	
0	5.2	
0	5.6	
0	6.0	
0	6.4	

CSOCLRT1 CASH & SC TO CURR LIAB -1YR

Mean .296 Std Dev .616

BRRT1 BORROWING RATIO -1YR

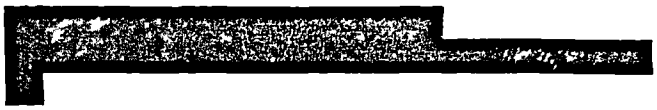
Count	Midpoint	
0	-1.00	
83	-.25	
120	.50	
16	1.25	
4	2.00	
0	2.75	
0	3.50	
0	4.25	
1	5.00	
0	5.75	
0	6.50	
0	7.25	
0	8.00	
0	8.75	
0	9.50	
0	10.25	
0	11.00	

BRRT1 BORROWING RATIO -1YR

Mean .459 Std Dev 1.019

CFMRT1 CASH FLOW MARGIN -1YR

Count	Midpoint
1	-227
0	-211
0	-195
0	-179
0	-163
0	-147
0	-131
0	-115
0	-99
0	-83
0	-67
0	-51
0	-35
0	-19
86	-3
135	13
2	29



CFMRT1 CASH FLOW MARGIN -1YR

Mean 5.418 Std Dev 16.159

PMRT1 PROFIT MATGIN -1YR

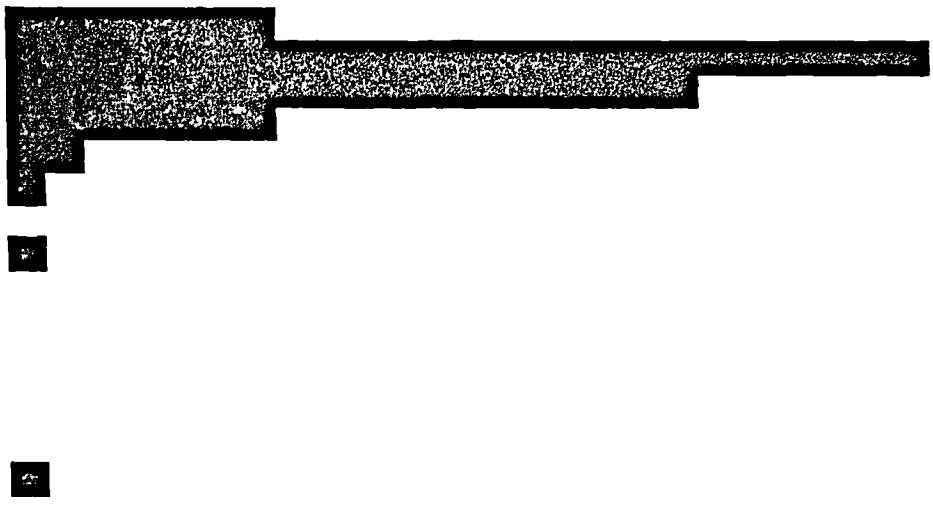
Count	Midpoint
1	-263
0	-245
0	-227
0	-209
0	-191
0	-173
0	-155
0	-137
0	-119
0	-101
0	-83
0	-65
0	-47
0	-29
11	-11
200	7
12	25

PMRT1 PROFIT MATGIN -1YR

Mean 4.973 Std Dev 18.776

QART1 QUICK ASSET RATIO -1YR

Count	Midpoint
0	-.4
24	.1
93	.6
67	1.1
27	1.6
6	2.1
4	2.6
0	3.1
2	3.6
0	4.1
0	4.6
0	5.1
0	5.6
0	6.1
0	6.6
1	7.1
0	7.6

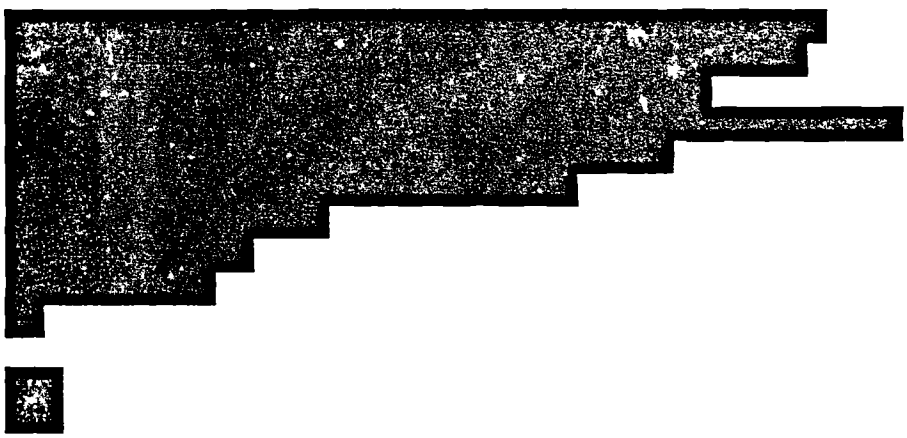


QART1 QUICK ASSET RATIO -1YR

Mean .937 Std Dev .685

CGRT1 CAPITAL GEARING -1YR

Count	Midpoint
0	-15.0
0	-7.5
35	.0
34	7.5
29	15.0
40	22.5
27	30.0
24	37.5
12	45.0
10	52.5
8	60.0
1	67.5
1	75.0
2	82.5
1	90.0
0	97.5
0	105.0



CGRT1 CAPITAL GEARING -1YR

Mean 23.154 Std Dev 18.467

EPST1 EARNING PER SHARE -1YR

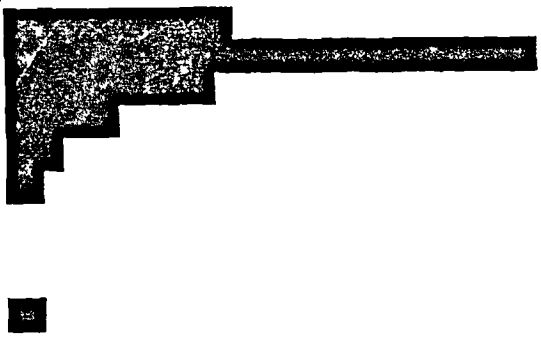
Count	Midpoint
30	-3
103	6
55	15
25	24
4	33
2	42
3	51
0	60
1	69
0	78
0	87
0	96
0	105
0	114
0	123
0	132
1	141

EPST1 EARNING PER SHARE -1YR

Mean 11.769 Std Dev 13.085

MVTOBV1

Count	Midpoint
43	0
105	7
37	14
17	21
7	28
6	35
5	42
1	49
0	56
2	63
0	70
0	77
0	84
0	91
0	98
0	105
1	112

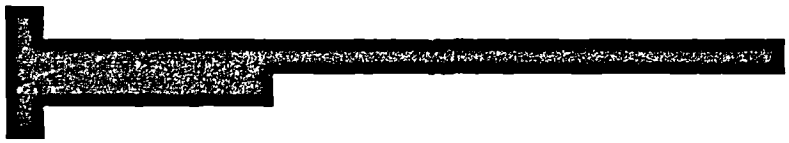


MVTOBV1

Mean 11.398 Std Dev 12.539

FGFOASE1

Count	Midpoint
1	-4.3
0	-3.9
0	-3.5
0	-3.1
0	-2.7
0	-2.3
0	-1.9
0	-1.5
0	-1.1
0	-.7
5	-.3
164	.1
50	.5
2	.9
1	1.3
0	1.7
1	2.1



FGFOASE1

Mean .216 Std Dev .371

FGFOS1

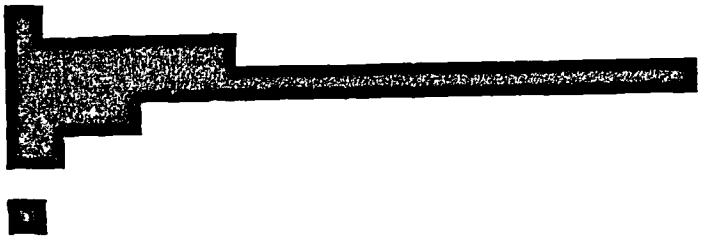
Count	Midpoint
0	-2.6
1	-2.4
0	-2.2
0	-2.0
0	-1.8
0	-1.6
0	-1.4
0	-1.2
0	-1.0
0	-.8
0	-.6
0	-.4
0	-.2
150	-.0
71	.2
2	.4
0	.6

FGFOS1

Mean .076 Std Dev .171

FGFOMV1

Count	Midpoint
0	-.4
5	-.2
42	.0
143	.2
24	.4
6	.6
0	.8
2	1.0
0	1.2
0	1.4
0	1.6
0	1.8
0	2.0
1	2.2
0	2.4
1	2.6
0	2.8

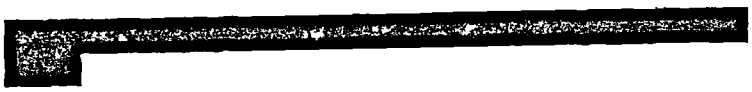


FGFOMV1

Mean .206 Std Dev .258

TSASE1

Count	Midpoint
1	-6.50
0	-5.75
0	-5.00
0	-4.25
0	-3.50
0	-2.75
0	-2.00
0	-1.25
0	-.50
200	.25
21	1.00
0	1.75
1	2.50
0	3.25
0	4.00
0	4.75
1	5.50

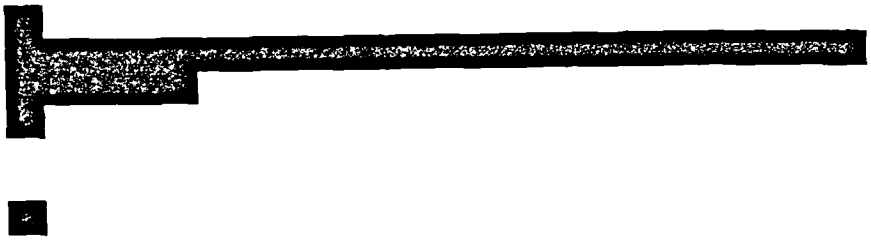


TSASE1

Mean .329 Std Dev .625

TSS1

Count	Midpoint
1	-2.1
0	-1.9
0	-1.7
0	-1.5
0	-1.3
0	-1.1
0	-.9
0	-.7
0	-.5
0	-.3
4	-.1
180	.1
32	.3
4	.5
0	.7
1	.9
2	1.1



TSS1

Mean .125 Std Dev .208

TSMV1

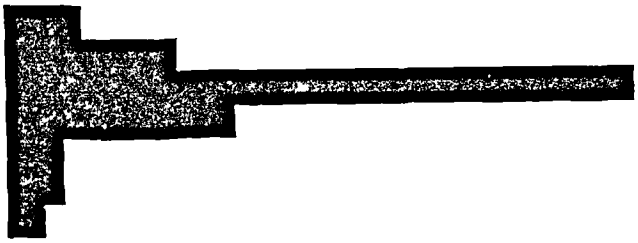
Count	Midpoint
0	-.4
6	-.2
21	.0
131	.2
45	.4
11	.6
4	.8
2	1.0
0	1.2
1	1.4
0	1.6
1	1.8
0	2.0
0	2.2
1	2.4
1	2.6
0	2.8

TSMV1

Mean .286 Std Dev .308

MILASE1

Count	Midpoint
0	-2.0
0	-1.8
1	-1.6
0	-1.4
0	-1.2
0	-1.0
1	-.8
2	-.6
10	-.4
30	-.2
127	.0
43	.2
4	.4
4	.6
2	.8
0	1.0
0	1.2



MILASE1

Mean .007 Std Dev .226

MILFS1

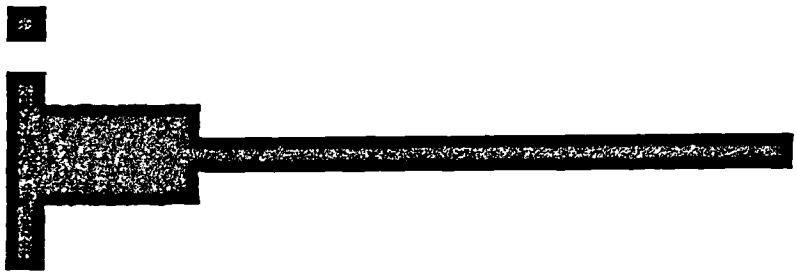
Count	Midpoint
1	-2.9
0	-2.7
0	-2.5
0	-2.3
0	-2.1
0	-1.9
0	-1.7
0	-1.5
0	-1.3
0	-1.1
0	-.9
0	-.7
0	-.5
2	-.3
100	-.1
120	.1
1	.3

MILFS1

Mean -.015 Std Dev .209

MILFMV1

Count	Midpoint
0	-1.2
1	-1.0
2	-.8
2	-.6
4	-.4
36	-.2
135	.0
34	.2
3	.4
3	.6
1	.8
0	1.0
1	1.2
1	1.4
0	1.6
1	1.8
0	2.0

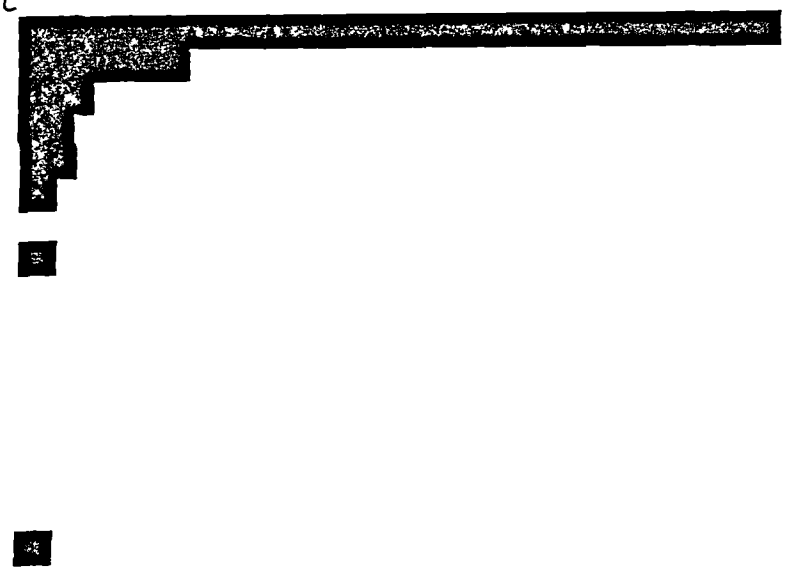


MILFMV1

Mean .021 Std Dev .261

SALET1 TOTAL SALES -1YR

Count	Midpoint
160	50617
32	151671
10	252725
5	353779
5	454833
2	555887
1	656941
3	757995
1	859049
0	960103
1	1061157
1	1162211
0	1263265
0	1364319
0	1465373
0	1566427
3	1667481



SALET1 TOTAL SALES -1YR

Mean 128579.273 Std Dev 249846.263

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